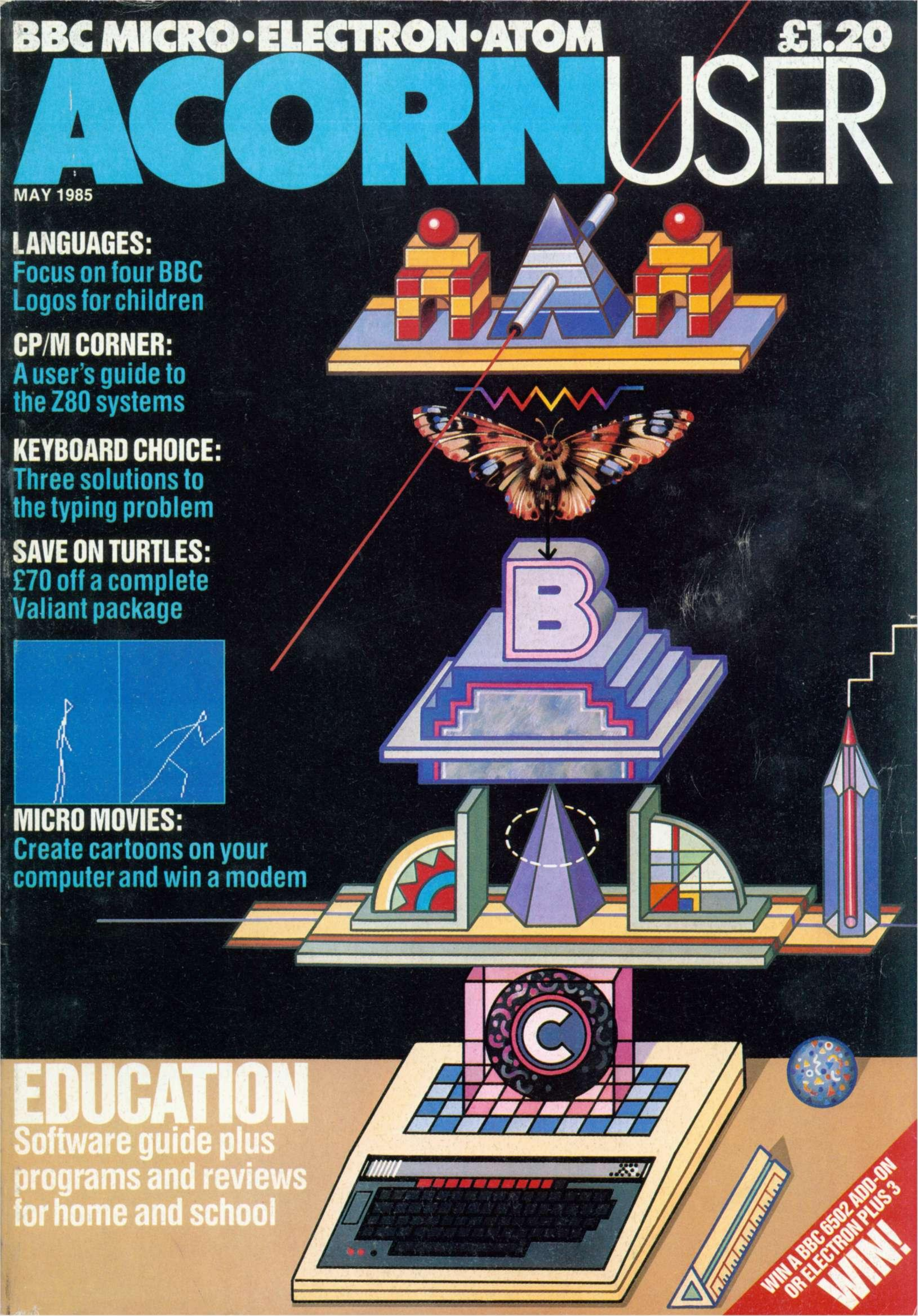
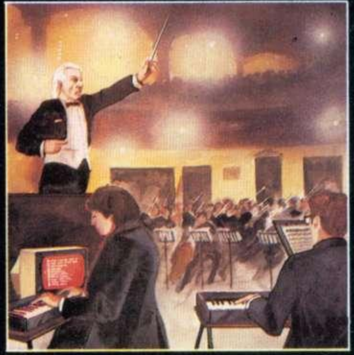
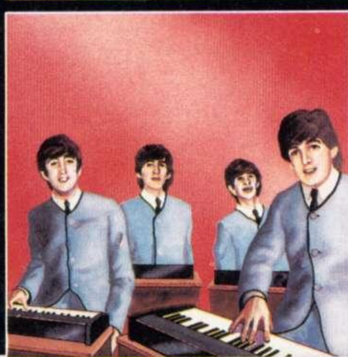

BBC MICRO·ELECTRON·ATOM
£1.20
ACORN USER
MAY 1985
LANGUAGES:
Focus on four BBC Logos for children
CP/M CORNER:
A user's guide to the Z80 systems
KEYBOARD CHOICE:
Three solutions to the typing problem
SAVE ON TURTLES:
£70 off a complete Valiant package
MICRO MOVIES:
Create cartoons on your computer and win a modem
EDUCATION
Software guide plus programs and reviews for home and school
WIN A BBC 6502 ADD-ON OR ELECTRON PLUS 3
WIN!

MUSIC MICRO PLEASE!









FOR FURTHER INFORMATION AND ADDRESS OF NEAREST DEALER,
TELEPHONE 0602 394000



£99.95
incl. VAT

The highly acclaimed



musical synthesizer

For the BBC Model B & Commodore 64 microcomputers

(Both prices incl. VAT)
£49.95
Fitting kit
£4.95

A musical package for users of all ages
For the beginner or the accomplished musician, the superb touch sensitive Echo keyboard will soon have you exploring the musical possibilities of your micro.

Complete with Software
Supplied complete with Organmaster in disk or cassette form. A powerful, yet easy to use software allowing you to imitate various instruments such as piano, flute, violin and piccolo, as well as providing a wide range of percussion effects, and a synthesizer mode allowing you complete control of the voice envelopes, so you can design your own sounds.

Optional speaker/amplifier
Echosound, a speaker/amplifier combination capable of delivering more than 5 watts to its 6" double cone speaker, is available for the BBC micro. At the tweak of a knob, you can switch from the whisper of a sobbing violin to the roar of a fairground engine.



The Future. Designed not only for today, but with the future in mind. A continuous programme of new software is being produced, aimed at providing you with ever new exciting sounds and capabilities from your Echo keyboard.

LVL

Regent House, Lenton Street,
Sandiacre, Nottingham NG10 5DJ
Telephone (0602) 394000



CONTENTS

FEATURES

NEW USERS

ATOM

YELLOW PAGES

The major listings for this issue are printed in the yellow section starting on page 97. These are also available on cassette (which includes a tape-to-disc transfer routine and index program) and in bar code format to save you typing them in. For details of how to order these, see pages 96 and 103



Micronet members look out for free *Acorn User* programs. See page 75 for a great competition

REVIEWS

REGULARS

Editor *Tony Quinn* Technical editor *Bruce Smith* Sub-editor *Julie Carman* Editorial assistant *Kitty Milne* Art assistant *Simon Carter* Publishing director *Michael Potter* Editorial director *Christopher Ward* **Editorial** Redwood Publishing Ltd, 68 Long Acre, London WC2E 9JH. Tel: 01-836 2441. **Advertising** Simon Goode, Advertising manager, Computer Marketplace Ltd, 20 Orange St, London WC2H 7ED. Tel: 01-930 1612. **Subscriptions** Kate Evans, Subscription manager, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Tel: 01-836 2441. Rates: UK £15; Europe £25; Middle East, Americas, Africa £30; Rest of the world £35 (prices include p&p for 12 issues). Published by Redwood Publishing Ltd, 68 Long Acre, London WC2E 9JH.

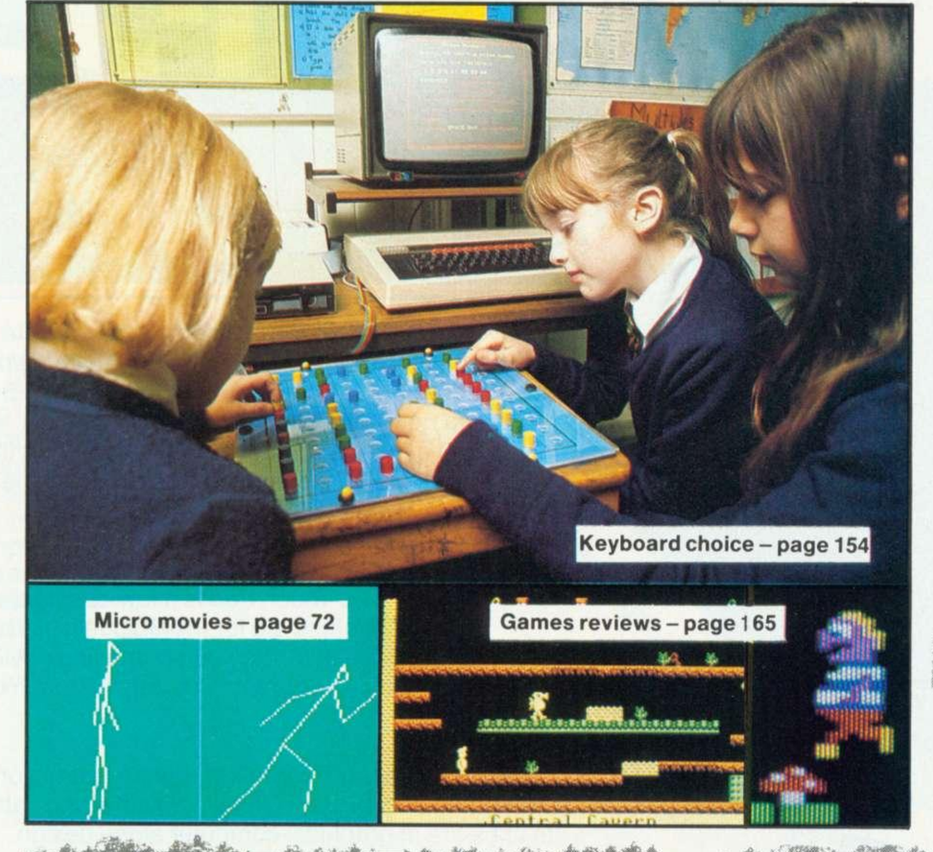
Typeset and printed in Great Britain by Watmoughs Ltd, Bradford. Print production by Aquarius Print and Design, London. Distributed to the news trade by Comag, Tavistock Rd, West Drayton, Middlesex UB7 7QE. Tel: (0895) 44405.

CONTENTS

25 free Ocean games – page 11

Save £70 in our turtle offer page 79

EDUCATION SPECIAL — MAY


Keyboard choice – page 154

Micro movies – page 72

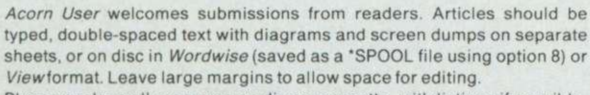
Games reviews – page 165



EDUCATION

COMPETITION

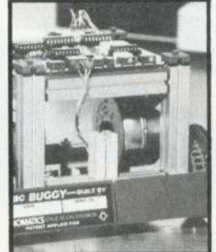
BUSINESS



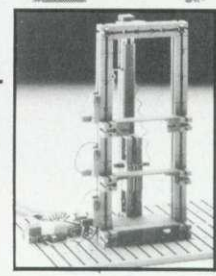
Acorn User
May 1985
Issue number 34

Cover illustration
by Peter Bentley

NEXT MONTH



ROBOT SPECIAL
What's around, how they work with your micro and how to use them



Sideways RAM utilities

First of three articles on using these boards

Scrolling noticeboard

Leave messages that move as you read them

Languages: Comal

Why is this language so popular in foreign schools?

View printer driver

Save yourself a fortune with this excellent program

Making music

The Music 500 put to the test by Ultravox

Notes for authors

Acorn User welcomes submissions from readers. Articles should be typed, double-spaced text with diagrams and screen dumps on separate sheets, or on disc in *Wordwise* (saved as a *SPOOL file using option 8) or *View* format. Leave large margins to allow space for editing.
Please enclose all programs on disc or cassette, with listings if possible. Also follow the style used in presenting listings in the yellow pages section. Photos should be 35mm, or larger, transparencies, or 5in by 7in black and white prints. Ensure your name is on everything, and keep a copy. Enclose a suitable stamped, addressed envelope if the submission is to be returned. Attach a short letter with the article giving its title with a daytime phone number if possible. Address your article to the Technical editor. Articles are acknowledged on receipt, but not submissions for the regular columns, letters pages and competitions. Please limit telephone enquiries to the Technical editor to Wednesday and Thursday afternoons.





So now you have got your home computer, you're ready to talk to Cumana – the best name in memory. Already a market leader throughout Europe for their range of disk drives Cumana now have other products on offer, all to the same exacting standards that have made their disk drives the number one choice in the home and in education.

The Touch Pad

The Touch Pad is a low-cost graphic plotting aid for the BBC micro. This compact display cursor moving device simplifies programming with the touch of the stylus.

The product comes complete with an instruction booklet, basic software, stylus and connecting cable. Its uses are in graphics, computer aided design, education and games.

£69.95
including VAT.

BE SAFE NOT SORRY

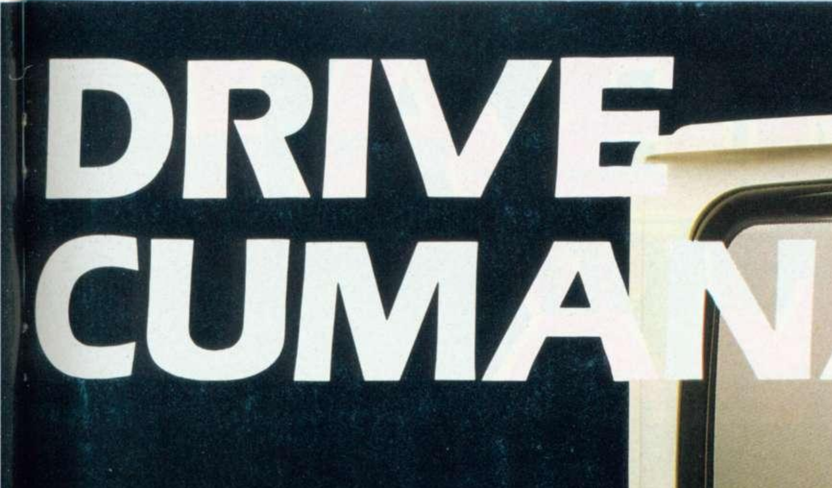
Cumana's CS range of single disk drives have been subjected to the strict safety demands of the BEAB.
They have now been awarded BS415 approval, so if you value safety do not trust it to anything less than Cumana.
Cumana's dual range of disk drives have also been submitted for approval.

THE MARK OF SAFETY



Disk Drives

Cumana have spent years on research, development and marketing a range of drives second to none. Their drives are compatible with BBC, Spectrum, Dragon, Oric, Tandy Models III and 4 and Video Genie. They are fully guaranteed for 12 months and approved for electrical safety by the D.M.E.E. and are extensively used in GLC and ILEA establishments. Cumana were the first independent disk drive supplier and are now Europe's market leader. Their products have been proven in the schools, universities and homes throughout Europe. Let us drive you in the right direction, send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Currys, and Spectrum UK.



Cumana BBC Microcomputer compatible disk drives:
Cumana disk drives supplied with formatting diskette, drive connecting cable and Cumana user guide. Independent power supply, mains lead and moulded plug included.

CS100 40 Track single sided (100K)	£164.95
CS200D 40 Track double sided (200K)	£169.95
CS200 80 Track single sided (200K)	£192.95
CS400 80 Track double sided (400K)	£219.95
CD200 2 x 40 Track single sided (200K)	£294.95
CD400D 2 x 40 Track double sided (400K)	£325.95
CD400/S 2 x 80 Track single sided (400K)	£359.95
CD800/S 2 x 80 Track double sided (800K)	£414.95

Cumana disk drives with independent power supply, mains lead and plug. Excluding other accessories.

CS100E 40 Track single sided (100K)	£149.95
CS200ED 40 Track double sided (200K)	£192.95
CS200E 80 Track single sided (200K)	£180.95
CS400E 80 Track double sided (400K)	£208.95

Cumana disk drives supplied with formatting diskette and Cumana user guide. Power supply taken from BBC Microcomputer, with lead supplied.

CSXL100 40 Track single sided (100K)	£115.95
CSX100 40 Track single sided (100K)	£124.95
CSX200D 40 Track double sided (200K)	£134.95
CSX200 80 Track single sided (200K)	£159.95
CSX400 80 Track Double sided (400K)	£189.95

3½ INCH DRIVES

CSX351 40 Track single sided (100K)	£139.95
CSX354 80 Track double sided (400K)	£199.95
CDX352 2 x 40 Track single sided (200K)	£256.95
CDX358 2 x 80 Double sided (800K)	£383.95

The 'X' range takes its power from your microcomputer.

CS351 40 Track single sided (100K)	£169.95
CS354 80 Track double sided (400K)	£229.95
CD352 Dual 40 Track single sided (200K)	£299.95
CD358 Dual 80 Track double sided (800K)	£429.95

The 'CS' range comes complete with power supply.

The Acorn Electron Computer

A microcomputer with a proven track record. Using BBC Basic, the Electron was developed out of the Micro that has been chosen for over 80% of schools participating in the Government's current Micros In Schools project. It connects into almost any TV set and cassette player and is supplied with a comprehensive User Guide which runs through, in a simple to follow manner, the basic principles of programming. A wide range of software is available, including games, educational packages and home accounts.

Disk interface now available for the Acorn Electron, Spectrum and Spectrum + Dragon 32/64, details from Cumana.
Electron Interface £149.95 inc. VAT.

Diskettes

Only when Cumana found a double density diskette up to their stringent quality control requirements, and at a price that made sense to the end user, were Cumana ready to put their name to it.

The result was a top quality diskette, complete with a plastic protective case for the ten-pack (they are also sold in two-packs!) together with index stickers.

Cumana diskettes are available now in both 5¼ inch and 3½ inch as single or double-sided, 40 or 80 track, from your local computer dealer. Don't trust it to chance, go for the best name on record.

DISTRIBUTORS/RETAIL

Available from the following retail outlets: W.H.Smith, John Lewis Partnership, Greens Leisure, Laskys, Spectrum UK.

Area distributors:
Addons Ltd (Southampton) 0703 34775/6. Audio & Computer Centre Ltd (Jersey) 0534 74000. Eltec Home & Business Computers (Bradford) 0274 722512. Fairhurst Instruments (Wilmslow) 0625 525694. HCCS Associates (Gateshead) 0632 821924. Hugh-Symons Distribution Services Ltd (Bournmouth) 0202 26535. Kingdom Design (Belfast) 0232 643720. Lightning (Harrow) 01 969 5255. Microage Distribution Ltd (North London) 01 205 7688. Microworld (Edinburgh) 031 228 1111. National Micro Centre (Stockport) 061 429 8080. Northamber PLC (Chessington). Silicon Express (Leicester) 0533 374917. Thompson Cook Distribution Ltd (Birmingham) 021 328 3895. J. S. Simnett Computers (Kingston-upon-Thames) 01 541 1495.
+ National Dealer Network



Cumana Limited, Pines Trading Estate, Broad Street, Guildford, Surrey. GU3 3BH
Telephone: 0483 503121

All Prices Inclusive of VAT.
All 80 Track 5¼" Drives are Switchable to 40 Track Mode

All prices are subject to change without notice.



Electron discs

CUMANA has released a disc interface for the Electron running through the Plus 1 add-on. See page 9.

Adventure for beginners

LEVEL 9's graphic adventure *Emerald Isle* for the BBC has 230 locations, each with its own picture. At £6.95, it's cheaper than usual, but then the company says it's not quite so mind-boggling and better for beginners.

Eight new music discs

PERFORMER is a real-time recording package for users of the MIDI interface connecting electronic instruments to the BBC micro.

It is one of eight pieces of software for MIDI produced by Electromusic Research and sold in music shops. Prices range from £15 to £45 for each disc.

User port extra

A PLUG-IN board to provide two extra user ports through the 1MHz bus on the BBC is available for £30 from Hardworks, 1 The Corner, Horsey, Great Yarmouth NR29 4EH.

Mole on micros

MOSAIC is to release two computer games based on the Adrian Mole books in the autumn to coincide with a Thames TV series.

The games are being written by Level 9, who also did *Eric the Viking* for Mosaic.

Graphics mouse

GRAPHICS is the strength of a mouse package from SMC Supplies which comes with sprite and character designers as well as a full painting system.

The mouse costs £60 from SMC at 11 Western Parade, Great North Rd, Barnet EN5 1AD.

Phone-tapping Bill could hit hackers

by Bill Penfold

HACKERS who use their computers and modems to break into electronic databases could soon be faced with hefty fines and even jail.

Tough new legislation against illegal phone tapping has inadvertently given victims of hackers a way to hit back: until now they could only charge offenders with minor items such as stealing electricity.

Now up to two years in prison plus £2000 in penalties are in prospect for hackers – many of them teenagers – who use public telecommunication systems to break into private networks, computer mailboxes or computer communications. It will end the uncertainty in the present law and enable courts to hand out sentences to match the offence.

New powers

The new powers will be a spin-off of the Government's controversial Interception of Communications Bill now being piloted through the Commons by Home Secretary Leon Brittan. The main aim of the Bill is to enable the Home Office to authorise telephone tapping without breaking the European Convention of Human Rights. But it will also set out stringent penalties to prohibit other people from tapping the phone system — or illegally breaking into computer systems.



Home Secretary Brittan

The Bill covers all public telecommunications systems, including links with abroad.

Concern over the activities of the hackers has risen rapidly over the last two years and came to the attention of the politicians last autumn with the headlines over the illegal break-in to Prince Philip's Prestel mailbox.

That incident grabbed public notoriority, but behind the scenes British Telecom and the Home Office had long been worried about the increasing number of hackers – some of whom regard it as merely a challenge, while others have more sinister intentions.

The Bill – with connotations of MI5 bugging CND and civil liberties organisations – is one of the most contentious pieces of legislation currently going through the parliamentary pipeline. Apart from the activities of the security agencies, most of the attention has inevitably focused on the world of international espionage, subversion and big-time crime.

But the Home Office and British Telecom were well aware that the Bill will effectively provide a legal framework for cracking down on the hackers.

The prospect clearly pleases British Telecom whose spokesman explained: 'Anything which gives greater control over the activities of some of those hackers is to be welcomed. The position has often been rather difficult. In many cases the only thing you can get them for is "theft of electricity", which was not really very satisfactory. So the proposed legislation will be very useful.'

Grey area

Not all hacking, however, will be covered by the new legislation. It appears to be a grey area if you use the public telephone system to break into a private data bank. But anyone illegally logging into a Prestel or Telecom Gold mailbox will soon be able to find the full force of the law descending on them.

This is clearly stated in the first clause of the Bill which says it will be an offence to 'unlawfully intercept communications' while they are being passed on public telecommunications systems.

● PRESTEL has decided to get tough and make an example of the hackers who it believes broke into the Duke of Edinburgh's mailbox last year.

The police, apparently acting on a BT tip-off, swooped on two suspects who have been charged with forging devices for recording information on Prestel computers. One of these 'devices' was a computer disc. Both face up to 10 years in prison.

We're showing off again

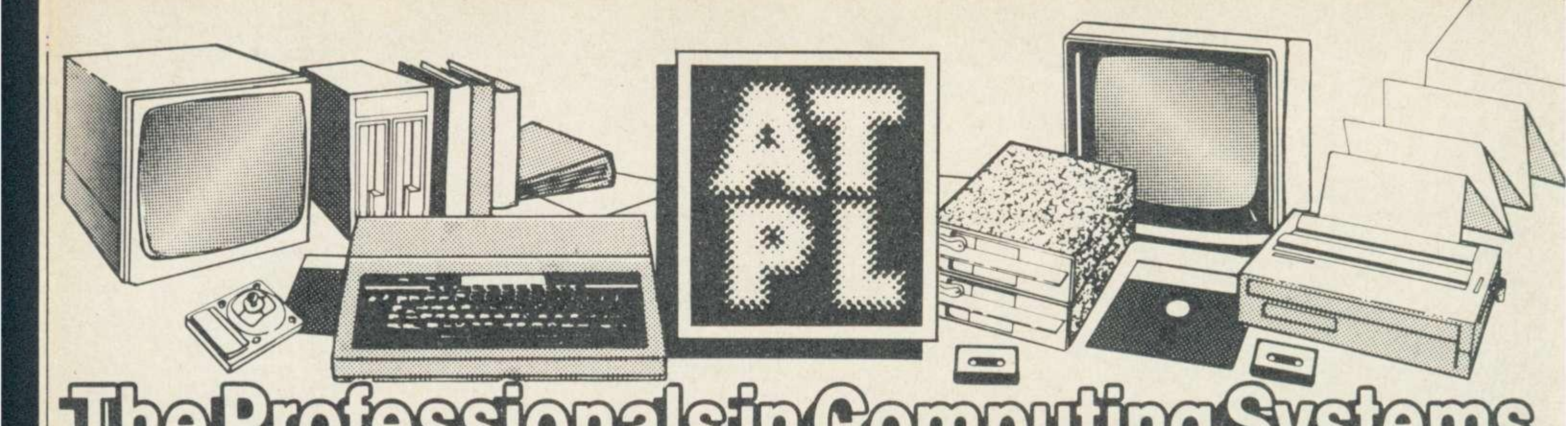
THE 1985 Acorn User Exhibition will run from July 25 to 28 (Thursday to Sunday) at the Barbican Centre in London. With 25,000 people expected through the doors, and more than 100 exhibitors, it looks set to be another great show.

The entrance fee will be £2 for under-16s and £3 for adults, with a £1 discount on tickets ordered from the organisers in advance.

The exhibition will be based in the Barbican's Hall A, with special sections devoted to communications, business, education and the home user.

Details from Acorn User Exhibition, 20 Orange St, London WC2H 7ED. Tel: 01-930 1612. Look out for the latest news in future editions of Acorn User.

● READERS who are Micronet members should look out for free listings to download by modem and news from *Acorn User*.



The Professionals in Computing Systems

We offer a design development and manufacturing service for companies wishing to improve their products using Microprocessor Technology.



- ★ FULL SIDEWAYS ROM EXPANSION to total of sixteen ROMS.
- ★ 16K battery backed CMOS RAM option – RAM is treated as ROM number 15 on read.
- ★ Software for SIDEWAYS ROMS may be down loaded and run in RAM under the true SIDEWAYS environment before transfer to EPROM using ATPL's EPROM programmer.
- ★ EXISTING sockets on BBC are usable and all EPROM sockets are accessible without removing SIDEWISE.
- ★ PLUG – IN – AND GO construction. Mounts neatly inside the BBC machine.
- ★ NO SOLDERING required to fit SIDEWISE.
- ★ FULL BUFFERING of address and data busses – prevents data bus loading problems associated with unbuffered boards.

The BBC Computer can run software packages stored on EPROM using the four "SIDEWAYS ROM" sockets on its printed circuit board. Now that an ever increasing range of software packages for word processing, financial planning and other applications are available in this format, there is a need to expand the facility and take advantage of these developments.

ATPL has designed SIDEWISE which provides you with a further twelve sockets giving a total capability of sixteen SIDEWAYS ROMS, the maximum number capable of being supported by the BBC computer operating system. In addition to the ROM expansion, one of the SIDEWAYS ROM sockets may be defined as RAM, permitting SIDEWAYS ROM software to be loaded into the RAM area of the machine using normal OS commands. Once loaded, the RAM may be used like any other SIDEWAYS ROM and the limitation of having only sixteen sockets is effectively removed.

EVER HIT YOUR 'BREAK' KEY WHEN YOU DIDN'T MEAN TO?

FOR THE BBC MICRO

Fit ATPL 'BREAK-LOCK' to your BBC Micro and avoid disaster where inadvertant use of 'BREAK' will cause loss of data and/or programmes.

ATPL 'BREAK-LOCK' is a 2 position key-switch that will:

- ☐ Prevent accidental or unauthorised use of the 'BREAK' key.
- ☐ Act as a security device to prevent unauthorised use of your system more effectively and cheaper than security ROMs.
- ☐ Easily and neatly fit in the 'Ash-tray'.
- ☐ Render demonstration machines tamper-proof.

BREAK · C · AT PL · C · BREAK-LOCK

£8·53 +50p p&p + VAT

SYMPHONY

COMPATIBLE WITH ACORN MUSIC 500 (Software available)

Also available from ATPL:
ACORN MUSIC 500
ISLAND LOGIC MUSIC SYSTEM

£125 INCLUDING V.A.T. AND DELIVERY

The Electronic Keyboard for the BBC Micro

The 'Symphony' Electronic Keyboard provides simulation of a wide range of musical instruments and sound effects through your BBC micro computer

FEATURES INCLUDE

4 Octave 49 note C-C keyboard with full size keys	Software includes sound effects simulating musical instruments — piano, organ, violin, banjo, jazz bass, etc.
Software included for up to 100 different sound effects to be created and modified whilst you are playing.	Octave shift, pitch bend and auto repeat functions
Complete set of 100 effects can be saved or loaded to or from disk or cassette	Optional 'sustain' foot switch for extra control
Effects selected by use of function keys	External amplifier or connection to Hi-fi system options available
Each effect can be given a name for easy reference and an index continuously displayed	The 'Symphony' Electronic Keyboard pack includes: keyboard and connector cable to BBC micro user port, software (please state disk or cassette) and comprehensive user guide

ATPL offer you the full range of BBC computers and peripherals. Send an S.A.E. (A4) for full technical data and our latest competitive prices.

SIDEWAYS ROM EXTENSION SOCKET

ONLY £13·00 p+p 50p + VAT



INSIDEOUT is designed to make a sideways ROM socket available outside the BBC computer, to allow for easy exchange of sideways ROM's.

CAN BE USED FROM BBC MODEL B OR EXPANSION BOARD SOCKETS ● SUPPLIED WITH LOW INSERTION FORCE SOCKET FOR EASE OF USE
NO COSTLY CARTRIDGE PACKING ● EPROM PLUG IN AND GO ● NOT LIMITED TO ONE DEVICE ● SOCKET RATED AT 100'S OF INSERTIONS
MOUNTED OUTSIDE THE BBC. EASILY REMOVED AND REFITTED ● CAN BE MOUNTED IN USER DEFINED LOCATION — NOT FITTING IN AN ILLEGAL POSITION

ATPL SPECIAL OFFERS
for BBC Computers

8K CMOS RAM for ATPL SIDEWISE EXTENSION ROM/RAM BOARD
1 off £21
2 off £40

8K CMOS RAM PLUS SPOOLIT for SIDEWISE RAM AREA
Turns it into an 8K or 16K printer buffer
1 CMOS RAM + SPOOLIT DISC £31
2 CMOS RAM + SPOOLIT DISC £50

8K CMOS RAM PLUS DFS SHIFT for SIDEWISE RAM AREA
Allows you to recover &OEOO to &18FF on a disc based system
2 CMOS RAM + DFS SHIFT £50

8K CMOS RAM PLUS SIDESWIPE for SIDEWISE RAM AREA
Allows you to save and load sideways ROM's to disc
1 CMOS RAM + SIDESWIPE DISC £31
2 CMOS RAM + SIDESWIPE DISC £50

DISC BASED PROGRAMS
SPOOLIT £10
DFS SHIFT £10
SIDESWIPE £10

Please Add 50p p&p + VAT



Advanced Technology Products Limited

Dept AU5
Station Road, Clowne,
Chesterfield, S43 4AB.
Telephone: (0246)
811585 (4 lines)

CONDITIONS OF SALE & DELIVERY
Cheques made payable to Advanced Technology Products Ltd. please allow 28 days for delivery. Cost of carriage or postage refer to each section. Quantity orders and oversea's carriage charged at cost. Condition of sales available on request.



ACCESS accepted. Carriage to be added to advertised price, then add VAT to the total.

In accordance with our policy of progressive development, we reserve the right to modify specifications without prior notice.

Telford's book

JOE Telford, well known to readers for his Jottings, has written a book, *BBC Micro Advanced Programming*, published by Prentice Hall at £9.95. With more than 100 programs in 392 pages, it's pretty comprehensive.

School saving

READERS who feel they may qualify for discounts under Acorn's Micros in Schools scheme should contact the company's education division for details of the nearest dealer taking part. The number is (0223) 245200.

Torch upgrade

TORCH has released an improved version of its Unix system known as the Unicorn 1024. The speed of the 68000 chip at the heart of the £3000 add-on has been raised and the RAM available increased to 1Mb.

Contact Torch at Abberley House, Great Shelford, Cambridge CB2 5LQ, tel: (0223) 841000.

Podd's a winner

PODD from ASK won the best educational software of the year title from the Computer Trade Association. The program aims to teach children aged five to ten about verbs, and is available for the BBC micro and Electron.

Micros for trade

THE London School of Foreign Trade has opened a software library at 61 Westminster Bridge Road, London SE1 7HT, tel: 01-928 6810.

Slomo change

SLOMO, the device to slow down software referred to in February's issue, is available from Nidd Valley Products and not Cambridge Computing Research as stated. For details contact Nidd on (0423) 864488.

TAB grows

A CLOSED user group for BBC micro users is being established on The Australian Beginning (TAB).

TAB has been operating since 1981, with a bulletin board, product and club news and electronic shopping.

Electron marches on

ACORN has committed itself to supporting the Electron until the end of 1986, and said that the machine will continue to be manufactured.

Alex Reid, the company's acting chairman, made these statements just before Acorn's shares were re-released on the stock exchange.

Electrons are still being supplied to British Telecom as part of the Healthnet communications system. They are being made in small numbers while present stocks left over from Christmas are run down.

The first casualty of the slimmed-down Acorn is the customer services department which has been disbanded. The four new divisions covering consumer, education and training, scientific and industrial, and training within the company are expected to look after their own customers, rather than everything going through one department as it has done for two years.


Reid


Piol

Anyone contacting Acorn is told to approach their local dealer, but even dealers aren't getting much information and are waiting to see what happens next.

Manufacture of BBC micros will be controlled by the education division, whose director was formerly head of production at Acorn.

On the ABC front, 54-year-old Elserino Piol of Olivetti who masterminded the Acorn deal has said in an interview with an Italian newspaper that there will be no overlap between products produced by the two companies.

Meanwhile, Acorn must be hoping that some of its products will be suitable for use by American communications giant AT&T. The company owns a quarter stake in Olivetti, and a deal between the two is largely held to be responsible for the Italians' profits leaping almost 70 per cent over last year.

Business news – page 127

Control hardware with a Banana

Plug in a Banana for control

MONKEYS who want to learn about control technology should get hold of a Banana Micro Interface, says Castle Associates, because it's so easy to use.

The Banana plugs into the user and printer ports of the BBC micro and its various output voltages can be controlled to drive motors, relays, etc. Protection circuitry inside the metal case protects both the Banana and the micro. It costs £175 plus VAT.

Castle Associates aims to release hardware and software for experiments to add to the book of ideas provided. Contact the company at Salter Road, Cayton Low Road Industrial Estate, Scarborough YO11 3UZ. The number is (0723) 584250.

New software for teachers

MICROMATH is a new journal aimed at people using micros in education for teaching maths.

ATM, the Association of Teachers of Mathematics, has joined forces with publishers Basil Blackwell to produce *Micromath*, the first issue of which appears this month. For details contact Blackwell's at 108 Cowley Road, Oxford.

For English courses, Longmans has released a series of language games under the collective title *Quartext*. For £35 (plus VAT), the user receives two 80-track discs – one containing the programs, the other ten sample texts.

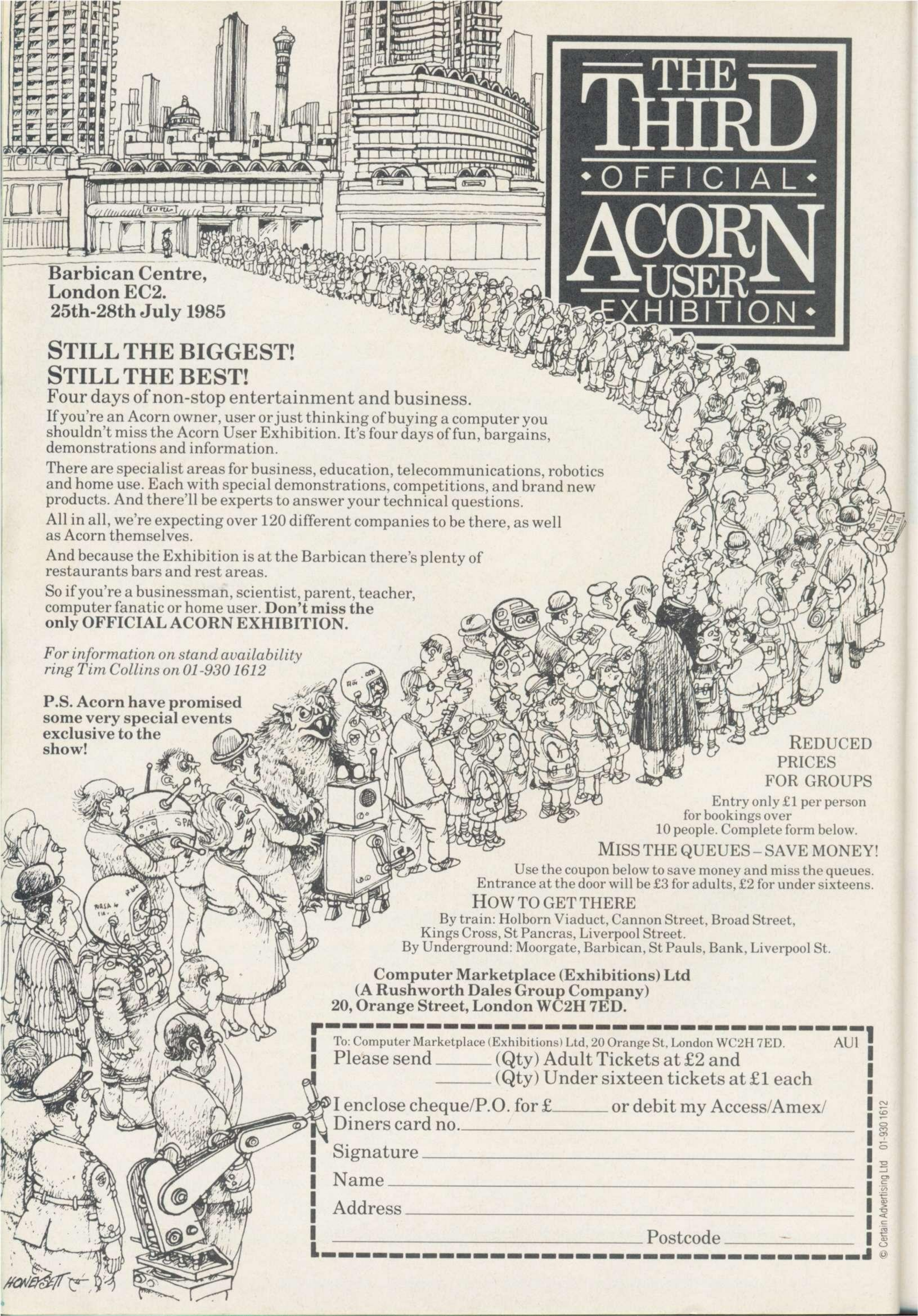
Available separately for £30 is *Textloader* which is a sort of wordprocessor to create new passages of text for the games. Longman also produces discs at £12 each for teachers of English as a foreign language.

Six simulations from John Wiley cover map-reading, being stranded on desert islands, orienteering, sheep dog trials, a scavenger hunt and river rafting. They are aimed at children aged seven to 13.

All are designed to develop specific skills relevant to each task and encourage general strategy planning with group discussion.

The programs are supplied on 40/80 track discs with teachers' and students' notes. They cost from £14.95 to £19.95.

Finally, the MUSE conference runs from July 29-31 and will be held at Nottingham University.



THE THIRD
• OFFICIAL •
ACORN USER
EXHIBITION •
Barbican Centre,
London EC2.
25th-28th July 1985
STILL THE BIGGEST!
STILL THE BEST!
Four days of non-stop entertainment and business.
If you're an Acorn owner, user or just thinking of buying a computer you shouldn't miss the Acorn User Exhibition. It's four days of fun, bargains, demonstrations and information.
There are specialist areas for business, education, telecommunications, robotics and home use. Each with special demonstrations, competitions, and brand new products. And there'll be experts to answer your technical questions.
All in all, we're expecting over 120 different companies to be there, as well as Acorn themselves.
And because the Exhibition is at the Barbican there's plenty of restaurants bars and rest areas.
So if you're a businessman, scientist, parent, teacher, computer fanatic or home user. Don't miss the only OFFICIAL ACORN EXHIBITION.
For information on stand availability ring Tim Collins on 01-930 1612
P.S. Acorn have promised some very special events exclusive to the show!
REDUCED PRICES FOR GROUPS
Entry only £1 per person for bookings over 10 people. Complete form below.
MISS THE QUEUES – SAVE MONEY!
Use the coupon below to save money and miss the queues. Entrance at the door will be £3 for adults, £2 for under sixteens.
HOW TO GET THERE
By train: Holborn Viaduct, Cannon Street, Broad Street, Kings Cross, St Pancras, Liverpool Street.
By Underground: Moorgate, Barbican, St Pauls, Bank, Liverpool St.
Computer Marketplace (Exhibitions) Ltd
(A Rushworth Dales Group Company)
20, Orange Street, London WC2H 7ED.
To: Computer Marketplace (Exhibitions) Ltd, 20 Orange St, London WC2H 7ED. AU1
Please send ______ (Qty) Adult Tickets at £2 and
______ (Qty) Under sixteen tickets at £1 each
I enclose cheque/P.O. for £______ or debit my Access/Amex/ Diners card no.______
Signature ______
Name ______
Address ______
______ Postcode ______
HONEYSETT
© Certain Advertising Ltd 01-930 1612

Schools network goes into colour

by Geoff Nairn

THE Times Network for Schools now carries pages of colour and high-resolution graphics. The communication network hooks up BBC micros in schools using the Telecom Gold electronic mail service, but until now it has been based on a black and white text-only screen.

The addition of colour pages using viewdata and hi-res graphics opens up the Network to far more educational applications. Also, it ensures the Network can compete visually with Prestel.

Possible applications of the new graphics pages include geography – there's a detailed map of Britain on the system already – and colourful competitions. When such a page is read by a school's BBC micro, the network system software automatically switches the computer into graphics mode.

Although it was revealed in *AU* back in August 1984, the Times Network for Schools was only officially launched this April. However, every LEA in the country has subscribed to the Network and by the end of the month, over 2000 schools should be on-line. Derbyshire LEA has set up its own database within the Times Network, containing teachers' information and a children's gazetteer of Derbyshire.



Maths on disc. and at Oxford

TEACHERS of maths in secondary schools can look forward to their own conference in July. 'Mathematics at 16+' will be held at St Peter's College in Oxford from July 22 to 24. The fees range from £45 for non-residents without meals to £65.

For full details, contact the conference secretary at 41a West St, Oundle, Peterborough PE8 4EJ.

The MEI project, which is behind the conference, has also produced a series of software to support teaching subjects such a graph plotting, statistics, numerical analysis and matrix algebra.

Each 40/80-track disc costs £17.50 and all are compatible with the 6502 second processor and Econet levels one and two. Contact MEI at the same address above.

Stock bulletin

TECHNOMATIC has launched its own phone-in information service using Prestel protocol.

The system will initially run in the evening and at weekends with information on products the company stocks, and details of ordering and availability. Techno-line hopes to expand to 24-hour coverage, and will run on 01-452 1500 at 1200/75 and 300/300 baud.

Tube software

TUBELINK, the Viewfax database for users of second processors, is carrying free software to convert discs from CP/M to the Torch CPN format.

Benjamin Rietti, the 14-year-old editor, claims it is the most popular service for BBC owners with articles on using the Tube, machine code and ROM software.

Prestel users can access Tubelink on page 258216.

Old games with new owners

QUICKSILVA has taken over the rights to seven games developed by Liverpool software house Bug Byte. This is the second such deal recently, with Ocean taking over Imagine titles after the company folded.

Meanwhile, Incentive is to market its *Confuzion* game for the BBC micro and Electron at £6.95.

66 83 55 52 86 ? ? ? 5 54 36 35 52 82 87 36 51
What is the sum of the missing numbers?



25 FREE TAPES

WIZADORE

Just clip the coupon below for the chance of a free copy of Wizadore, the new graphics adventure from Ocean Software for the BBC micro.

The first 25 coupons pulled out of the postbag at the Acorn User's Long Acre offices will receive a tape.

And that's not all: Ocean is offering £100 for each of the next five months to the first entry out of the hat which completes the adventure. Simply write the codeword given at the end of the game on the form from the cassette inlay card and send it off to Ocean. The name of the £100 winner each month will be printed in Acorn User. Full details are given with each tape.

Look in Acorn User to see if you've won

But first of all, take your chance to get a free game. Cut out the coupon below and send it to: Ocean Offer, Acorn User, 68 Long Acre, London WC2E 9JH.

If my coupon is one of the first 25 pulled out of the postbag at Acorn User, please send me a free copy of Wizadore, the graphics adventure from Ocean.

Name ....

Address...

...........................Post code.............

AMX MOUSE

Catch an incredible AMX MOUSE! The advanced opto-mechanical device that brings to your BBC micro facilities once only available on more expensive computers. Now you can use ICONS, WINDOWS AND POINTERS in your own programs.

AMX PACKAGE

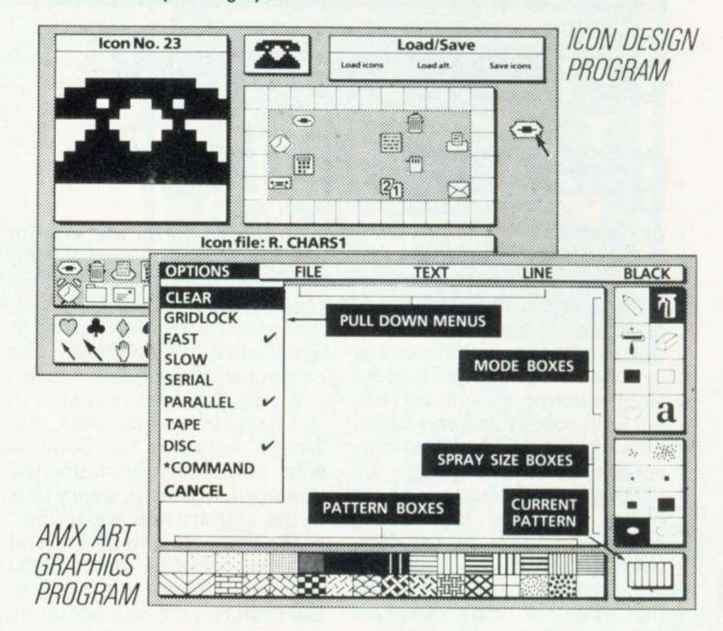
Plug the MOUSE into the user port, and the EPROM into your board. The latter contains fast machine code routines for creating on-screen windows, icons and pointers. And means that the MOUSE buttons can be progammed for use with commercial software such as Wordwise and View. There are two manuals included, explaining how to operate the MOUSE and the ROM routines, which are available in both basic and machine code programs.

Included in the package are two superb programs:

AMX ART has to be seen to be believed! It's a computer-aided drawing program that's just as good for serious applications–such as the preparation of detailed architectural and engineering drawings or teachers' worksheets–as it is for having lots of family fun! And if you're artistically inclined, you'll be astonished at the quality of work you can produce and save. It makes full use of on-screen menus, pull-down menus and icons: the ideal, easy way for novices to learn and gain in confidence.

ICON DESIGNER is an invaluable program for creating and storing icons for use in your OWN programs.

The AMX MOUSE may be used with any BBC Model B fitted with the Operating System 1.2; and it's compatible with the 6502 second processor and disc or tape filing systems.



ICON DESIGN PROGRAM

AMX ART GRAPHICS PROGRAM

New! AMX DESK

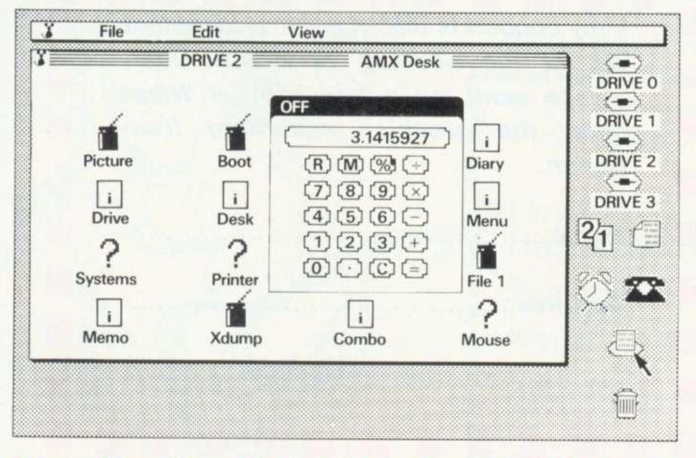
DISC ONLY £24.95 INC VAT

A terrific new program designed for the AMX MOUSE. If you want to get properly organised–at home or at work–DESK is for you!

The main screen contains a desktop with header offering SYSTEM, FILE and EDIT menus–plus an additional menu for extra features; and there's a constant time display.

Down the right-hand side are icons displaying Disc Drives, Memo Pad, Telephone Book, Diary, Alarm Clock, Printer and Trash Can. Simply by using your MOUSE you can select any service you require.

- MEMO PAD–Up to three pages of text may be stored. With printing at the touch of a button.
- TELEPHONE/ADDRESS BOOK–Up to 200 or 400 entries (depending on disc drive capacity) with handy scrolling search.
- DIARY–Displays a calendar for three months, centred on the current month, with scrolling backwards and forwards. Dates with entries are highlighted; select a date and view the entries.
- ALARM–Sounds at the time you've pre-set, whichever DESK service you're using.
- CALCULATOR–A full-function calculator can be brought on-screen at any time, and results can be stored for use in Memo Pad, etc.



Any window showing Telephone/Address Book, Diary or Memo Pad may be dumped to the printer by simply selecting the printer icon.
An interface program for Wordwise + and View means pictures created with AMX ART can be merged with text upon printing out.

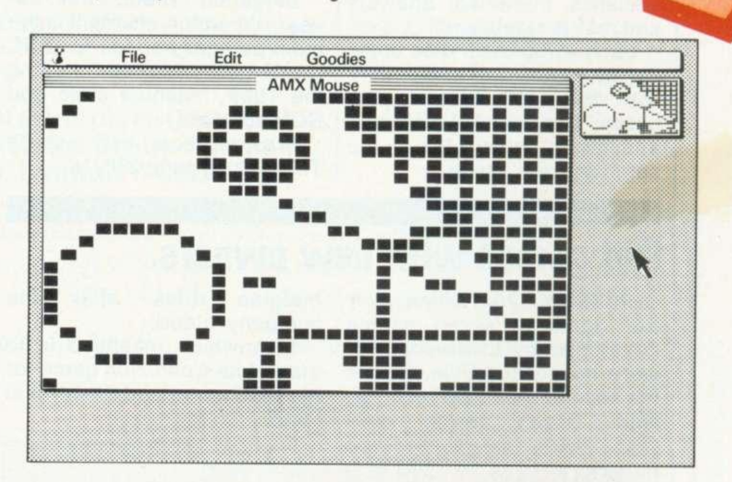
New! AMX UTILITIES

DISC ONLY £14.95 INC VAT

Another remarkable new program for the AMX MOUSE. Now you can enjoy many drawing features you'd never expect to find at this price!

The Zoom facility means easy and accurate amendments to your drawings: one dot becomes a character. You can copy, rotate and reflect; enhance circles; draw ellipses and arcs; and print icons, too. Borders can be added, and pictures can be stripped and centred ready for saving and printing.
There's colour sketch, too...
Great for budding artists!

All disc software is available on 40 or 80 Track and 3" disc. Please state which you require when ordering.



These exciting AMX products are available from top computer dealers. Or you can order direct from us. Send cheque/PO to Advanced Memory Systems Ltd, Green Lane, Appleton, Warrington WA4 5NG. Ring (0925 62907)602690 for instant ACCESS and VISA orders.

See us on **Mouse Links** on Viewfax tube link on Prestel: **Page No. *258216#**

If you're into program writing....

Get this into an envelope

If the programs you are writing involve sophisticated graphics, you have two choices, a severe headache or Touchmaster.

Obviously you'll want to consider the matter, so in the mean time send away for your free Touchmaster literature and find out more about the best value/performance graphics tablet available... or take two pain killers!

TOUCHMASTER



Touchmaster Limited, PO Box 3,
Port Talbot, West Glamorgan, SA13 1WH.

To Touchmaster Limited, FREEPOST, Port Talbot, West Glamorgan, SA13 1ZZ.
Please send me free Touchmaster literature. AU5/85

Name

Address

Make of computer

Add discs to Electron

CUMANA has developed a disc interface for the Electron which works through the spare ROM cartridge slot on the Plus 1 add-on, as well as a double density controller for the Beeb.

The Electron product will control 5.25, 3in, or 3.5in drives using single or double density discs (the latter can hold twice as much information). It plugs into the Plus 1 and has a spare socket for ROM software. The device sells for £150, or £130 if a disc drive is purchased at the same time.

For BBC micro owners, there's a double density disc filing system called QFS. It is supplied as a kit of parts to plug into empty sockets on the BBC's circuit board (issue 4 – the board number is printed on the left near the copyright sign).

No soldering is needed to fit the kit.

Files

QFS costs £108, and apparently runs with *Elite* and *Aviator*. It is not limited to 31 files, as the Acorn DFS is.

The Cumana DFS brings the number available for the BBC to something like eight. Acorn has yet to announce a replacement for its aged 0.9 system using the 8271 floppy disc controller.

This chip is in very short supply and cannot support double density.

However, the 1770 controller chip from Western Digital is used in Acorn's Plus 3 disc box for the Electron. This does support double density and is used in the ABC range, so would appear to be the successor to the 8271 chip for the BBC.

THE POCKET PROFESSOR

COMPUTER DICTIONARY

THE GUIDE TO COMPUTING TERMS AND CONCEPTS

MICRO SOFTWARE
MINI HARDWARE
MAINFRAME PERIPHERALS

THIS picture isn't quite full-size, but it is almost. At 361 pages it's 18 mm thick. Definitely pocket-sized.

Software writers' guide

A GUIDE for educational software writers has been produced by the MEP's software unit at £25.

The 276-page book covers origination and design, coding, field trials, support, publication and evaluation of software.

In addition there are notes on BBC and RML machines dealing with speed, memory, sorting, machine code and robustness. A model publishing agreement is included.

The book, called *Educational Software: a Creator's handbook* is distributed by Techmedia at 5 Granby Street, Loughborough LE11 3LD.

●The CET has released guidelines aimed at making it possible for a database to be used by a wide range of data manipulation packages. The booklet is called *Draft File Interchange Format (FIF)*.

Ex-beauty star granted 7,8 on raft – confusion!

Meet the micro musicman

by Harry Sinclair

WE'VE all had a little difficulty with the SOUND and ENVELOPE statements haven't we? Controlling four channels isn't easy. Well, how would you lke to try it with up to 89 channels?

Melvyn Wright who writes the loading music for BT's Firebird games and Epic's adventures is something of a past master at doing just that.

One of his many talents is making the rolls for 'player pianos' and mechanical organs. Having worked out the arrangement, he has to calculate the exact position of each note on the roll, mark them out with a set square and then cut them out individually with a razorblade.

He says it can take up to a year of spare-time work to produce one with a complicated arrangement. Handling four channels must seem like bliss.



A Long Way to Tipperary is the tune for this title – one of Melvin's nine arrangements

I had been told that Melvyn, an ex-BT employee, could knock out an opus for the Beeb in a morning, but not so. He reckons an hour for four seconds of music – and *Fingal's Cave* which he did for a recent adventure from Epic lasts six minutes!

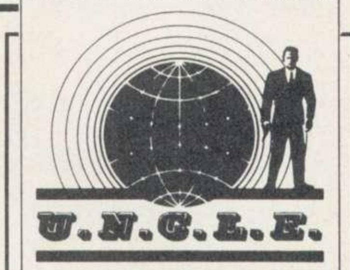
Amazingly, considering the complexity of his arrangements, Melvyn doesn't read music. He can hear what he wants in his head, and converts that to notes sitting at the piano.

Part of his secret is the method he has developed which allows him to compress the sound statement data (normally 4 bytes) into 1 byte, so his tunes can be considerably longer than most without grabbing too much memory.

Melvyn only started programming in 1981 on a ZX81. He wrote a program which did the impossible and made that little machine produce music. Moving on to a Spectrum, he was disappointed by its general lack of facilities and its musical abilities in particular.

That's why owners of the Beeb now have the pleasure of hearing his work.

THE MAN FROM



Our new columnist takes a sideways look at the news . . .

AFTER all the dust has settled, the interesting topic is where does Sinclair go from here? The Americans, despite some creakings from the direction of Commodore, are relatively secure with their huge home market. Amstrad has wider interests and is doing well (half year pre-tax profits up from £6.3m to £9.5m). Acorn is now in the soft embrace of the men from Turin (whose profits jumped 69 per cent over last year).

Sinclair is still very heavily dependent on one business area – home computing, a market which is showing all the signs of saturation. Forays into midget radios and TVs for those with 20/20 vision have not reduced that dependence significantly. The QL has not been a major success in getting Sinclair into business or education.

The electric trike, wondrous though it is, can only be seen as a big risk. It is hoped that 1986 will bring the launch of the C10, a two seater version (dual in line or transverse?). 1988/90 will see it boosted to the C15, a family four-seater with a top speed of 80 mph, and a range of 40 miles.

Work goes on apace to develop the new batteries needed to make all this come true. Perhaps Sinclair ought to devote a little money to pushing back other frontiers of knowledge.

Maybe they could form a consortium with Tonka Toys and the producers of Action Man to engage in the genetic engineering research necessary to produce a family small enough and daft enough to get into the C15!

Still, Uncle Clive is a fairly shrewd cookie who has come through against the odds before – one more lead balloon and he gets to keep the official receiver. Were his company ever to get into trouble, companies like GEC might move a bit more quickly than they did with Acorn.

Link to Giant Mainframes and network to thousands of Micro users via your 'phone with free Modems and Comms software in the British Telecom Modem competition.

British Telecom is offering 1000 free gift packs to plug direct into your home 'phone line.



1000 FREE MODEMS

500 for Spectrum/Spectrum +
350 for BBC Model B
150 for Commodore 64

And if you haven't got a square-type BT phone socket, British Telecom will arrange to alter your installation at no charge!

HOW TO ENTER

(Monday 22nd April to Sunday 5th May 6pm to midnight)

For the 5 questions 'phone
01-627 3000 or
021-449 9944 or
031-225 8999

To get the Tiebreaker Sentence 'phone
01-627 1199 or
0532 455030 or
0632 324444

Complete the entry form using your skill and judgement, and send it off in the next post.

RULES OF THE BRITISH TELECOM MODEM COMPETITION

1) The dial-in is available from 6pm Monday 22nd April to midnight Sunday 5th May 1985, when the competition closes.
2) Entries must be postmarked the next working day after the questions and tiebreaker were obtained.
3) Entries can only be made on the official entry forms and become the property of British Telecommunications plc.
4) The competition is open only to residents of the United Kingdom over the age of 18 years. Employees of the Network Marketing Unit of British Telecommunications plc and PARKER REDMILE LTD, and their dependants are excluded. Only one winning entry per household.
5) Entries not reaching the competition address before midnight on Thursday 9th May 1985 will not be considered.
6) A list of winners will be provided at the competition address. Please send an SAE if you wish to receive it.
7) The winners will be picked as follows from entries received on time and properly completed –
The entries for each type of prize pack with all correct answers to the 5 questions and with the tiebreaker sentences judged most apt and humorous by the competition organisers will be chosen, subject to the stock of appropriate prize packs.
8) The decision of the competition organisers is final and no correspondence will be entered into. Winners will be notified automatically.
9) British Telecommunications plc offers winners requesting BT 'phone socket conversion on entry forms to waive the charge normally made for such work.
10) Details of how to get on Prestel/Micronet 800/Telecom Gold will be sent to winners. Subscriptions not included in prize.

OFFICIAL ENTRY FORM

A. Your answers:

Q1 ....
Q2 ....
Q3 ....
Q4 ....
Q5 ....

B. Tiebreaker Sentence complete (25 words or less in total):

" ....
....
.... "

C. If I win, I would like the prize pack for the

☐ SPECTRUM/SPECTRUM +
☐ BBC MODEL B (Tick Choice)
☐ COMMODORE 64

D. My home telephone line (* Delete as appropriate)

(a) already has a square-type BT 'phone socket * or
(b) would need converting to square-type BT 'phone socket *

If (b), the person renting the line from British Telecom must fill in this declaration – If this is a winning entry, I agree to ask British Telecom to convert my line to square-type BT 'phone socket at a convenient date before 1st July 1985. My line is on Residential rental, is not a coinbox and is not shared service. I understand British Telecom will not charge for doing the work.

Name .... (Block Capitals)
Telephone number ....
Signature ....
Date 1985

E. I have read the rules of the British Telecom Modem competition and agree to abide by them. I am over 18 years old.

Signature of entrant ....
Date 1985
Name .... (Block Capitals)
Address ....
....
.... Postcode ....

POST IMMEDIATELY TO:–
British Telecom Modem Competition
PO BOX 73
MITCHAM
SURREY
CR4 2XU
(Postage stamp required)

WINNERS WILL BE NOTIFIED AUTOMATICALLY

British Telecommunications plc. Registered Office 81 Newgate Street LONDON EC1A 7AJ. Registered in England no. 1800000

Question time by modem

ACORN'S chairman Alex Reid and boss of Watford Electronics Nazir Jessa are two of the guests set to appear on Celebrity Chatline, Micronet's live interview feature.

Users of the electronic system will be able to supply their questions in the hour before the show goes out – 7-8pm on Wednesday evenings.

Micronet's editor David Babsky will put these questions to the guests and then send up the answers to appear on the country's computer screens as they are given.

Reid is scheduled to appear on May 8 and Jessa on April 24. Before then, on April 17, Paul Duffy of the Guild of Software Houses (GOSH) will be interviewed about piracy and how it affects the industry.

Richard Hooper of Prestel and Telecom Gold, who helped set up Micronet, will appear on May 1.

The programme is a spin-off from the Late Night Chatline which was accessed 1.9 million times in January, making it the most popular part of Prestel. Users on the Chatline can log on and talk to each other just like CB radio.

● David Babsky was one of two Micronet staff who took a tumble in a recent parachute jump to raise money for the Ethiopia famine appeal.

He and press officer Claire Walker were still hobbling around on crutches with their left feet in plaster for the first interview. They both landed on sheep.

Summer computer camps for all ages

COMPUTER camps are to be held all over Britain this summer for children and adults. Prices range from £13 a day to £90 a week, although costs vary with transport and facilities.

Dolphin camps cater for children aged 7–14, with BBC micros or Electrons for every child. Beaumont camps use several types of computer. Both feature Logo, robots and programming.

Under-sevens

Daybreaks courses are all focused around London and have similar timetables, but their Earlybird sessions take in computing for the under-sevens.

The Earnley Concourse caters for people over 16 with one- and two-day courses on various aspects of computing, from what can you actually do with them, through wordprocessing with *Wordwise* to learning Basic. Its computer centre runs BBC micros on an Econet.

Contact Dolphin at Grosvenor Hall, Bolnore Road, Haywards Heath RH16 4BX. Beaumont at 9 West Street, Godmanchester, Cambs PE18 8HG. The Earnley Concourse is at Earnley, Chichester PO20 7JL. Daybreak's address is Providence House, River Street, Windsor SL4 1QT.

Finally, Interaction is a charity which helps people set up their own computer camps. It trains potential course leaders in how to start and offers several books to get you going at the community level.

Interaction can be found at The Royal Victoria Dock, London E16.



Watch this space

SEIKO has announced a wrist watch that connects to a micro. The RC1000 is a quartz watch with LCD display that allows the user to carry an assortment of data, from telephone book to diary, on his wrist.

It has a capacity of 2k and software will be available to connect to Acorn micros. All data is entered from the computer keyboard and transferred through the RS423 serial port to the watch.

Price hasn't been finalised, but is thought to be around £120 for watch, cable (shown fitted) and software. It should be in the shops by July.

Prestel system for Australia

by Steve MacLeod

TELECOM Australia's Prestel-based videotex system, known as Viatel, should now be up and running.

Originally planned for 1982, the proposal was rejected by the then Government, but selection of the Prestel standard for the system was announced last year.

The emphasis so far has been on the quality of the information, rather than the quantity. There will initially be more than 45 information providers supplying news, weather, travel information and a range of consumer services such as home banking and shopping, in addition to electronic mail.

Software

A microcomputing service, including bulletin board facilities and the ability to download software, is expected shortly. No information was available on which computers will be catered for.

Viatel hopes to attract between 5,000 and 10,000 subscribers in its first year.

Telecom Australia is using Torch CH520 computers to create Viatel pages and for bulk updates of the system. Eight have been supplied by the Australian agent so far with a further 18 systems on order.

Six advertisers fall foul of ASA

SINCLAIR and Acorn are among the six companies in the computer market who have fallen foul of the Advertising Standards Authority in recent months.

The others were Software Supermarket, Data Technologies, Solidisk and Viglen. Several of the complaints were about incorrect prices in advertisements, and readers should always check on these before ordering.

The ASA is an independent body set up to monitor advertising claims.

Readers who have problems should write to ASA, Brook House, Torrington Place, London WC1E 7HN.

Open for repairs

RUMBELOWS has set up a repair service centre in London to cater for electrical equipment including computers.

The service centre is open from 8.30am to 6pm and is at Unit F, Greenford Industrial Estate, Field Way, Greenford, tel: 01-575 7400.

Help with Fortune

EPIC Software, the adventure company whose titles include *Wheel of Fortune*, has released free help sheets for customers who get stuck. Send an sae to 10 Gladstone Street, Kibworth Beauchamp, Leicester LE8 0HL.

Adventure chance

ADVENTURE Zone Software is running a competition with a £1000 cash prize for the best adventure game submitted. The top three will be marketed by the company. Details from 10 Ennis Close, Harpenden, Herts AL5 1SS.

Business for PCW

THE 1985 PCW Show is to be held at Olympia from September 4–8.

A special section for business computers will run alongside the main show in Olympia 2.

Details from Montbuild, 11 Manchester Square, London W1M 5AB.



HAL sings again in 2010 with Dr Chandra

On television

□ *The Learning Machine*, BBC TV's new series on computers and education, starts on April 25. Going out on BBC 1 at 10.55 pm on Thursdays for six weeks, the 25 minute programmes ask whether computers live up to expectations in the classroom. Why do girls miss out? And is learning Basic such a good idea?

It's aimed at parents, teachers and children alike – although at the broadcast time of 10.55 the BBC might be being a bit optimistic there. Leaflets, lists of software and demonstration packages are available from BSS, PO Box 7, London W3 6XJ. (Enclose sae).

□ LOOK OUT for *With a Little Help from the Chip*, a series of six BBC TV documentaries about how computers and new technology can help the lives of the disabled. Transmission times and dates have yet to be decided.

□ THAMES TV's *Database* series returns in June for its third series. More details nearer the time.

□ *QED*, CAN robots really do as much as people think? The QED team program a robot to pour a cup of coffee – but can it then fetch a chocolate biscuit? Heavy stuff. *QED*, BBC1, May 29, 9.25 pm.

On radio

□ *Chip Shop* . . . or rather it's not anymore. And the reason why reads like an episode from *Dallas* (another series that the BBC has lost).

The Radio 4 programme was scheduled to return in April for a third series and by all accounts the previous ones had been massively successful, with over a million micro buffs prepared to endure (sorry – listen to) Barry Norman's dulcet tones – and 3 million for the 'pop' Radio 1 version.

Chip Shop has never really had a proper 'home' or even a permanent staff and so the new series provided the ideal opportunity to press for a permanent studio in Manchester, and full-time staff. With all the furore over the BBC licence fee increase, and with the corporation threatening to cancel top-rating programmes such as *Doctor Who*, *Chip Shop* takes a low priority and so the third series has been put on ice. If, as seems likely, the Corporation does not get the licence fee increased to £65, then *Chip Shop* seems destined to go into permanent deep freeze.

□ *Inside Information*, Radio 4 VHF, 4.30 pm, weekly starting May 5. Ten programmes providing a basic grounding in information technology. Subjects include artificial intelligence, communications technology, control applications, etc.

□ April 9-20, London Festival of Computing, various locations. Kicks off with a four day extravaganza in Covent Garden (9-12th), featuring demonstrations of robotics, community computing and communications. Over the weekend (12-13th) there's a Logo Spectacular in Camden Town and to wind up (18-20th) there's the London Computer Fair in Central Hall, Westminster.

On film

□ On general release is *2010*, the sequel to *2001*. Worth seeing for the special effects which, as you might have guessed, owe a lot to computers. Some of the shots employ up to 10 separate elements – background, spaceships, etc, the movements of which all have to be co-ordinated if the shot is to look realistic. Enter the humble microcomputer, which controls and records the positions of the cameras.

On Show

□ April 16-18, Northern Computer Show 85, Belle Vue, Manchester. Contact 01-643 8040

□ July 25-28, Acorn User Show, Barbican, London.

□ July 29-31, MUSE Summer Course, Jesse Boot Conference Centre, Nottingham University. Three days of talks, conferences and an exhibition covering all areas of computers in education. Things to look out for – Acorn showing off their interactive video and Econet; talks on wordprocessors and spreadsheets in the classroom; six sessions about primary education – plus much more. Price is £57.50 for the three days and further details are available on (0482) 20268.

□ September 4-8, Personal Computer World Show, Olympia, London.

To contact

□ Acorn (0223) 245200
Acorn (London) 01-379 7358
Acornsoft (0223) 316039
A new bulletin board for modem users (1200/75 baud) is on (0223) 243642.

□ CABE (Computers in Adult Basic Education), c/o Pete Jeffs, Southern Neighbourhood Council, Hyslop Street, Liverpool 8. User group for ABE tutors in Adult and Further Education. Please send sae.

Blunderbox

□ APOLOGIES to one and all, the checksums provided in the Colours Interrupts (April) were incorrect. The checksums should be:
20203
21428
19413

□ MALCOLM Banthorpe's Turtle program (February issue) contained a slight error. In line 470 the + sign should in fact be a – sign. This now means that you turn left when LEFT is entered rather than turning right!

For help

□ To contact *Acorn User* authors, write c/o the editorial address given on page 2.

□ Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers with the BBC micro.

□ Monitor choice: Photocopies of the review of four monitors, plus a set of nine test programs from the June issue cost 72p (inc post).

How to present programs and articles

FIRST read the 'Notes for Authors' on the contents page.

Your submission should be original and have a practical use. We receive many articles on subjects we have already covered – often quite recently.

A neat and clear presentation is very important. A few hours' thought about how your article looks, diagrams, applications and documentation will ensure that it is evaluated quickly and efficiently, and is more likely to be accepted.

Program presentation is also important. Follow the 'standard' we've adopted in the yellow pages. Most importantly, your program must run on Basic 1. The only exception is if the program is of a Basic 2 tutorial nature. Basic and illegal calls to routines in the MOS should not be used. Program lines should increment in steps of 10, with the first four being REMed as per the format in the yellow pages.

Program listings should not be indented, and avoid multi-statement lines.

Use the standard assembler presentation, one mnemonic per line, upper case mnemonics with lower case labels. If the assembler is long include a checksum.

Provide a list of PROCs, FN's and variables detailing the operation of each on a separate sheet of paper, along with any hints or tips regarding entering the program.

Oxford Pascal is Fast

Oxford Pascal compiles down to FAST COMPACT P-code, giving you the real speed and power of Pascal, together with the ability to compile very large programs.

Oxford Pascal is Standard

Oxford Pascal is a full extended implementation of Standard ISO Pascal. This means that you can compile any Pascal program (subject to size), written on any computer, anywhere.

Oxford Pascal is Compact

Because it compiles into P-code, Oxford Pascal reduces programs into the most compact form possible. In fact it allows you to pack more code into your BEEB than any other language, and should your programs become too large, you can still use the CHAIN command to overlay limitless additional programs without losing data.

Graphics & Sound Extensions

In addition to the entire Pascal language, Oxford Pascal features a whole range of Graphics (all modes) and sound extensions designed to make maximum use of the BBC computer. Oxford Pascal also provides numerous extensions such as hexadecimal arithmetic and bit manipulation instructions.

Oxford Pascal in Education

In Education, Oxford Pascal is fast becoming a *de facto* standard. It is already the most popular Pascal on the Commodore 64, and will soon be released for the Spectrum and the Amstrad. In fact, Oxford Pascal will soon be available for 90% of the computers installed in the U.K., and is already available in German, French, Swedish, and American versions. **Students and teachers alike find that it makes sense to use a standard implementation of Pascal across the whole range of educational micros.** Call us for details of our generous educational discounts.

Resident and Disc Compiler

Oxford Pascal comes in two forms:

For Tape Users...Oxford Resident Pascal a compiler located largely in ROM which is available at any time. Programs can be written and compiled on the spot without disc or tape access, and compilation is fast enough to make using the compiler much like using the BASIC interpreter. Thus, learning Pascal is a simple interactive process. Some 15K of memory is available for user programs, the remainder being reserved for compiled object code.

For Disc Users...Oxford Disc Pascal offers all the above PLUS...a full disc compiler which is capable of using the WHOLE memory for Pascal object code, it is supplied with a powerful LINKER, allowing you to break large programming tasks down into separately compilable, easily-manageable files.

Manual

Both these compilers come with a manual which has been carefully designed, not only as a quick reference guide, but also as a full tutorial for those new to Pascal.





PASCAL
BBC and Electron
Friendly Error Messages
Many compilers produce little more than an error and line number to help correct mistakes in Pascal programs.
Oxford Pascal however, gives you one of 49 friendly and informative error messages, messages which not only indicate the reason for an error, but also print out the line in question with a pointer to the exact position where the error was detected.
Run-time errors are reported using line-numbers from the original source-program with a full explanation of how the error occurred.
EDITOR EXTENSIONS
Powerful Editor
With Oxford Pascal there is no need for you to learn how to use a new Editor. Pascal programs can be entered in exactly the same way as BASIC programs, without the need to learn any new commands. When you are used to using Pascal, you will find our extensions to the Standard Editor even more useful. What is more, Oxford Pascal allows you to mix BASIC and Pascal together, in much the same way that you can mix BASIC and assembler. In fact you can, if required, mix all three together...BASIC, Pascal and assembler...in one program.
GRAPHICS AND SOUND
Stand Alone Code
Unlike other compilers, Oxford Disc Pascal allows you to compile on the BBC and then relocate your program so that it will run on the BBC and on the Electron. The relocated program will run without a Pascal ROM and can be loaded and run from tape or disc just like any other program.
This means that you can distribute or sell your software freely and without the need for ROMs, to run on either of the above machines.
INTERACTIVE RESIDENT MODE
Price/availability matrix
	BBC 'B'	ELECTRON	C64	SPECTRUM
DISC	£49.95	Not yet!	£49.95	Available April 1st 1985
CASSETTE	£39.95	£59.95 inc. Cartridge	£22.95	
All prices are inclusive of VAT Please add £2.00 for postage and packing.
FRIENDLY ERROR REPORTING
Oxford Compilers — The Future
During the next year, we at Oxford will be releasing a series of language implementations such as C, and Modula 2, for the BBC, and other popular micros.
These compilers are being built, using the most modern techniques in automated compiler construction, and will bring to the micro-user, a level of robustness and efficiency, only now becoming available to mini and mainframe users.
Oxford Computer Systems (Software) Ltd.
Hensington Road, Woodstock, Oxford OX7 1JR, England
Telephone (0993) 812700 Telex 83147 Ref. OCSL
Oxford... the Compiler Compilers.
don't grow on trees
Oxford Pascal Order form. Please make cheques payable to OCSS Ltd.
Please rush me my copy of Oxford Pascal. I enclose £ .... including £2 postage and packing
My computer is BBC 'B'☐ ELECTRON☐ C64☐ (Please tick as appropriate)
I would like my compiler supplied on DISC☐ CASSETTE☐
Name
Address
Postcode
Telephone

Introduced only last November the SOLIDISK DDFS has enjoyed an unprecedented popularity in a very short time. We think the reason for this is the ease and simplicity of installation and use, along with the capability of 60% extra disc capacity in the Double Density mode. This coupled with realistic pricing makes our DDFS an absolute best seller.

WHICH DFS DO YOU NEED?

SOLIDISK produce no less than three types of Disc Filing Systems to cover all your requirements.

1. THE FLEXIBLE DDFS

The basic SOLIDISK DDFS (£38.95) is suitable for all ordinary users. It is supplied with the SOLIDISK 1.9 ROM. This ROM is compatible with the ACORN DFS; running all unprotected commercial software and disks from Acornsoft (Elite), Micro Power (Castle Quest), Island Logic (The Music System).

The 1.9 ROM offers both single and double density formats, with built in disc formatter and verifying, along with such features as automatic density sensing and 40/80 track software controlled switching. The speed is now programmable by the keyboard links to suit almost any type of disc drive and the maximum file size is now only limited by the capacity of the disc.

The DDFS can now be supplied with the Solidisk Most Advanced Disc Filing System (our 2.0 ROM). The total price of this system is £48.95 and the specifications are outlined below.

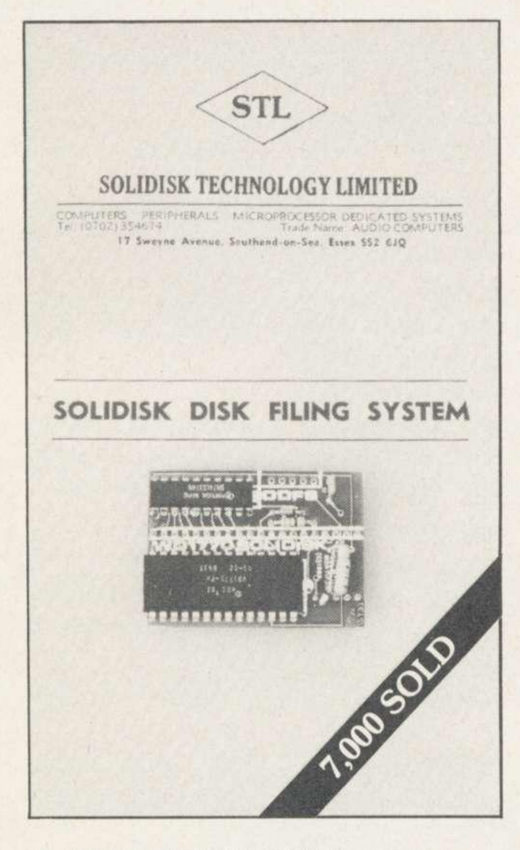
2. THE FAST 8″ CONTROLLER

This a totally new product intended for the business user where speed and reliability are paramount.

The date transfer rate of the 8″ look alike is double that of a standard 5.25″ double density formatted disc or an amazing four times that of a single density formatted disc. This gives a data transfer at the incredible speed of 500kbits or 64 k bytes a second.

This DDFS can be used with either 8″ disc drives or the Mitsubishi 8″ look alike or a mixture of the two.

Ideally suitable to be used with the Mitsubishi M4855 80 track double sided (2 MB unformatted or 1.3 MB formatted), the 8″ DFS costs only £69.95 inclusive.



3. THE SEDUCTIVE DFDC

Ideally suitable if you already have an Acorn DFS. The DFDC will not only add Double Density capability but also improve the speed of your 8271 chip.

The SOLIDISC DFDC (Dual Floppy Disc Controllers) is making a very large impact on the BBC user community with its extraordinary capability. It is currently supplied with the Solidisk Advanced Disk Filing System ROM 2.0 (£54.95).

The DFDC board simply sits in the place of the 8271 FDC chip (i.c.78) in the BBC. The 8271 is then inserted into the DFDC board and the ROM 2.0 inserted in place of the original DFS ROM.

Once the machine is up and running it is then simplicity itself to change FDCs; just throw the switch attached to the DFDC board, press BREAK and the other FDC is now selected.

This allows the user to get the best facilities available from both the 1770 and 8271 floppy disc controller chips with the minimum of fuss.

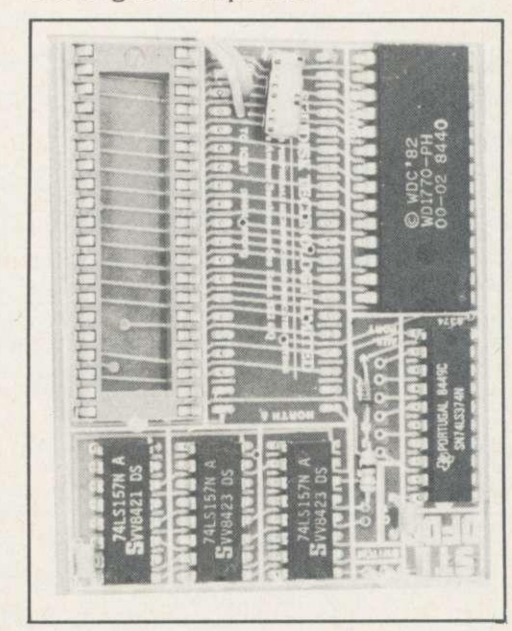
The DFDC board may also be used as a Stand Alone DFS if your BBC is not yet upgraded for disc systems. All the necessary chips and instructions are supplied and the 8271 may be added as an optional extra at a later date.

The SOLIDISK DDFS is now the ultimate in reliability with a minimum component count and software error trapping.

The DDFS consists of only 4 components to be plugged in to the BBC Microcomputer and can be fitted in just a few minutes by novice and expert alike.

Whilst many other manufacturers rely heavily on distribution outlets to do the selling for them, SOLIDISK relies on a good product and a large support network to win the heart of the user. With over 60 local experts, covering England, Scotland and Wales, a SOLIDISK National User Group in Holland and soon in Australia, SOLIDISK can offer many users regional free fitting and advice. Also with an ever increasing catalogue of free software, available to all SOLIDISK users, comprising of Programming tools, Graphic windows, Musical tunes, Spelling checker, Computer Aided Design, Disc utilities etc., even users who are new to the DDFS can expect to build up a large disc program library in a fairly short time.

Solidisk Software Support Service now has a responsibility to over 35,000 users and the ability to give you the best possible support matched only by the largest companies.



SOLIDISK TECHNOLOGY LIMITED
17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ
TEL. SOUTHEND (0702) 354674 (10 lines)

SOLIDISK DFS ROM 2.0 IS OUT:

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DDFS users and Acorn DFS users as an upgrade for the DNFS 1.2ROM.

Standard features include:

1) Unlimited Catalogue entries (up to disc capacity) without any special preparation.
With Computer Concepts's Disc Doctor or Watford's DFS, you have to specify BEFORE formatting if you want 62 filenames. Once formatted, you can no longer modify the format.
With ROM 2.0, there is no limit to the number of files and programs you can have on the same diskette. Until it is completely full.

2) Unlimited filesize.
This feature is sometimes a very good sales argument for databases.

3) Automatic Write Error Correction.
Every disk write operation is immediately followed by a read operation to ensure that the recorded data is free of all errors. Then if needs be, ROM 2.0 will restart the write operation from the unsafe sector.

4) Automatic 40/80 track stepping.
No other DFS allows you to directly backup a 40 track disk to an 80 track disk, even if you have a switchable disk drive, since the hardware cannot replace the software! ROM 2.0 allows you to backup and copy any 40 track disk to 80 track, single to double density (if available) even on the same drive without any special care.

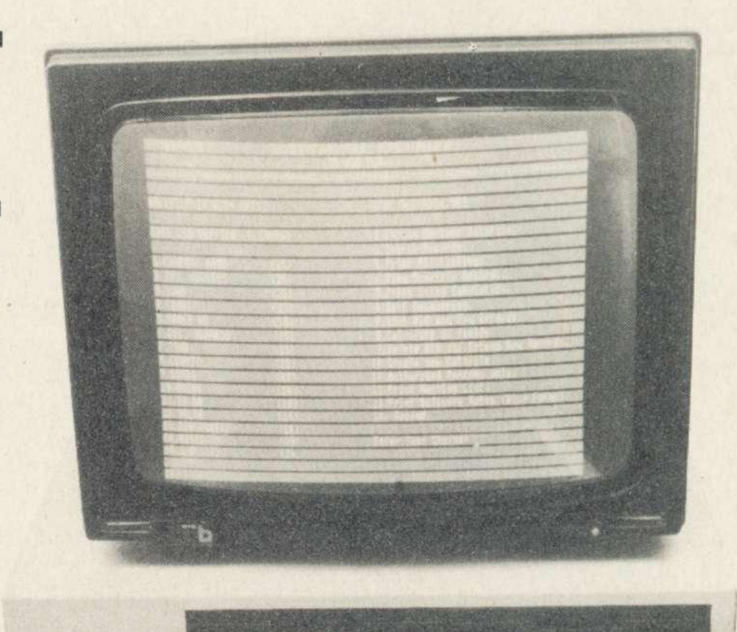
5) DISC REPAIR FACILITIES.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), re-write multiple sectors (*RESTORE), Read disk format (*R40 and *R80), recover bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC disks in under 1 minute in both single and double density (if available).

6) Tape to disc facilities.
This facility allows automatic transfer of all programs and most games to disk (*TAPEDISC and *LOADTAPE). Only in some cases (multi-part game cassettes), will you need Clare's utilities.

7) Wordprocessing facilities.
This facility allows !BOOT and other text files to be edited, saved and printed. Any screen mode and text up to 24k can be handled.

8) PRICE
The 2.0 ROM costs £20.00 to all Acorn DFS users. Included in the price are the Advanced DFS User Manual and VAT.
As an upgrade for the 8k Solidisk DDFS 1.9, the price is only £10.00 inclusive. Please note that you do not have to send back your present DDFS ROM when ordering, but post it later in the return envelope sent together with the 2.0 ROM, quoting your credit card number as a guarantee.

SOLIDISK KEYBOARD AND CPU ARE NOT JUST PRETTY . . .

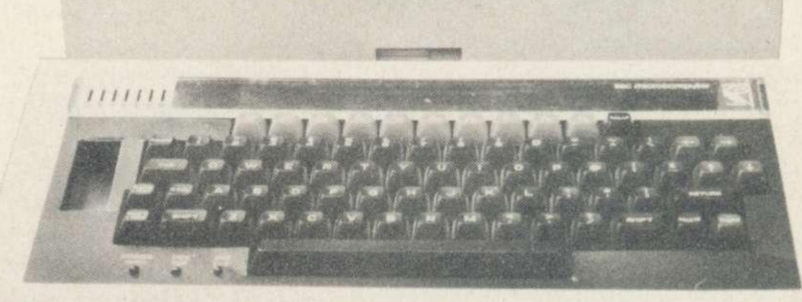


The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to the typist (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. There is good ventilation to the power supply too and all untidy cables are hidden away.

PRICE

The complete CPU and keyboard case costs £30.00 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer. Actually the best thing that happened to the BBC computer for a long time!



SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

SOLIDISK + MITSUBISHI BIG DEAL:

THE MITSUBISHI 640K DISK OUTFIT:
This offer comprises:

– One Double Sided, 80 track Mitsubishi M4853 disk drive, cased in beige.
– One Solidisk DDFS Single and Double Density Disc Upgrade.
– All leads and manuals (2).
– One Software package comprising 5 program diskettes as detailed below.
– Full one year guarantee.
– All for £209.95 inclusive of VAT and carriage.

IMPORTANT
If you upgrade (now or later) to twin Mitsubishi M4853 disk system, Solidisk will offer you, subject to stock availability, absolutely free a CPU and keyboard case as shown earlier.
For that, you have the choice of ordering a 640k Mitsubishi disk outfit now and then later on, of returning your disk drive, enclosing payment of £160 to cover the second disk drive and carriage. Alternatively, save by ordering right now a complete twin Mitsubishi (2MB unformatted, 1.3 MB formatted) Fantastic Offer at only £359.95 inclusive.



THE HARDWARE:
As described earlier as shown opposite.

THE SOFTWARE:
The software comprises 5 diskettes, formatted in 80 tracks. Volume 1 contains the Word Processor, Volume 2 the Database, Volume 3 the new Spreadsheet 1.1, Volume 4 the disc, tape utilities and a blank dictionary.
It would take several pages to describe them all. In general, they are of the highest standard as our hardware products. Only the first 2 volumes will be described below.

Volume 1:
Solidisk Word Processor and Spelling Checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP (filename), then start typing. What you see on the screen will be exactly printed on paper.
You don't even need to read the manual twice, the most useful commands are all displayed on the top part of the screen.
This Word Processor features 80 column screen throughout, direct on screen justification, automatic margins, page numbering, printer special commands, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, * commands etc, etc.
Solidisk WP loads and saves texts under 1 second flat and also you may save the edited version as many times and under any filename you like.
And also better than any other wordprocessor, you can spell check your document without leaving it, simply type in Control-U.
It has self dictionary generating capability too. You may create any dictionary you like simply by entering the words.
Solidisk WP is also excellent as a training tutor for Wordstar, as used on most 16 bit computers.

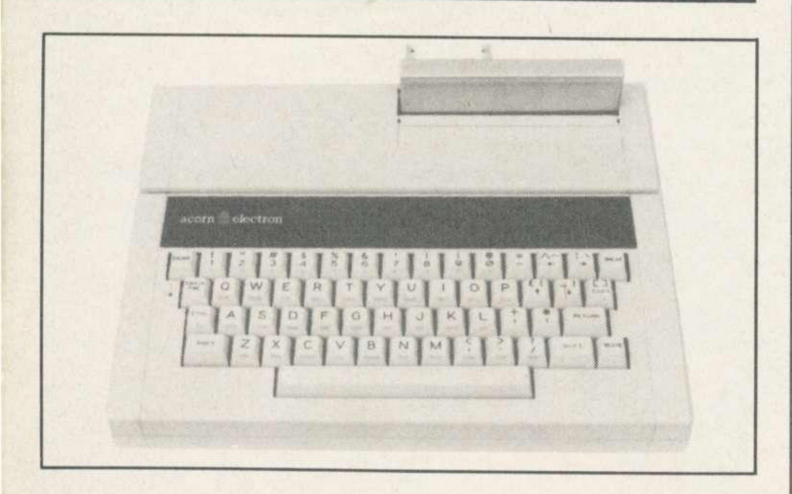
Volume 2:
Solidisk Database. Solidisk Database is a random access system, completely menu driven and more importantly, very easily customised to suit any particular need.
Important features include unlimited filesize and number of records, all maths functions and 80 column screen throughout. Solidisk Database is particularly simple to understand and easy to use. You are first presented with an option menu, which comprises 15 different options. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.
You can design a new database, list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. For instance, Solidisk telephone enquiries are dealt with by an ordinary BBC with twin Mitsubishi holding the last 4000 sales records. Typing in the name you retrieve the complete record quicker than you can remove your finger. It of course runs Solidisk Datafile.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

NEW PRODUCT ANNOUNCEMENTS

Solidisk MODEM.
Single chip FSK, Multistandard internal MODEM, requires no soldering, no adjustment.
Supplied with Menu Driven SoliComms 16k ROM, ready to be connected to any information provider such as Prestel or Gold.
Auto dialling, auto answer, auto baud rate, auto error correction.
Available soon. Price: £39.95 inclusive.

Solidisk Third Processor
Internally fitted 6502 compatible with Acorn Second Processor, 128k as standard, upgradable to 256k, 4 Sideways ROM sockets, software supplied in ROM allowing unused RAM to be loaded with Sideways Software or used as Silicon Disk. Available soon.
128k 6502 TP: £179.00 inclusive.
256k 6502 TP: £229.00 inclusive.



IN STOCK:

1) NEW LOW PRICE EPROMS.
2764s and 27128s are going down in price.
5 x 2764s now cost you only 24.95 per pack.
3 x 27128 now only 25.95 per pack.

2) PLENTY OF UVIPROMS AND UVIPACS.

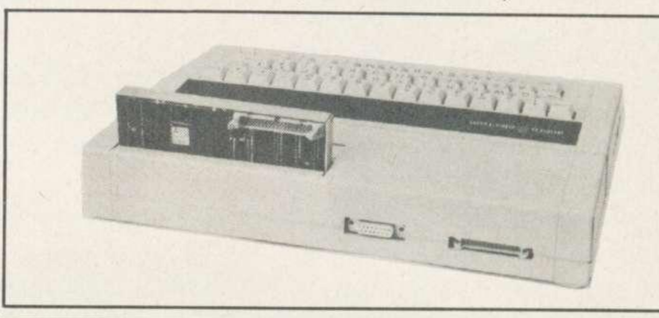
3) ELECTRON DISK INTERFACE.
This interface is BBC compatible and includes 3 Sideways ROM sockets.
It Plugs into the PLUS-1 and allows direct attachment of disk drive and software compatibility with BBC disks.

PRICE: £39.95 inclusive, P&P: £1.00.

SOLIDISK LOCAL EXPERTS

We have people able to fit your equipment free of charge in all the following towns. If your area is not mentioned, ring the office!

Dunstable, Leighton Buzzard, Reading, Peterborough, Wimslow, Penzance, Torquay, Wimborne, Basildon, Stroud, Southampton, Hoddesdon, Watford, Bexley, Margate, Rochdale, Boston, London (all areas), Oldham, Hunts Cross, East Dereham, Rushden, West Bridgford, Wantage, Bambury, Grimsby, Kingston, New malden, Woking, Taunton, King Norton, Sutton Coldfield, Halesowen, Leamington Spa, Hassocks, Salisbury, Swallowne, Leeds, Huddersfield, Treowen, Newtown, Newtownards, Co Fermanagh, Co Londonderry, Le Mesnil St Denis (France), Kalgoolie (Australia), Paramatta (New Sth Wales), Manawatu (New Zealand).



Short form price list. Full price list on request.

Qty Items	Prices	P&P
Sideways RAMs:		
SWR32	£58.95	£1.0
SWR64	£85.00	£1.0
SWR128	£149.95	£1.0
CPU & Keyboard Case (both)	£30.00	£3.0
Solidisk DDFS.		
DDFS (with 1.9 ROM)	£38.95	£1.0
DDFS (with 2.0 ROM)	£48.95	£1.0
DFDC (with 2.0 ROM)	£54.95	£1.0
8" Controller	£69.95	£1.0
Special Offers.		
640k Disc Offer	£206.95	£3.0
1.3MB Fantastic Offer	£356.95	£3.0
Eprom Equipment.		
Programmer	£19.95	£1.0
Eraser	£19.95	£1.0
2764 x 5 new low price	£24.95	£1.0
27128 x 3 new low price	£25.95	£1.0
Datalife Diskettes.		
MD525 SS/DD	£17.00	£1.0
MD550 DS/DD	£22.00	£1.0
MD557 2S/4D	£28.00	£1.0
65C02 with Software	£13.00	£1.0
Solimon-2 16k ROM	£13.00	£1.0
2.0 DFS 16k ROM	£20.00	£1.0
Total =		

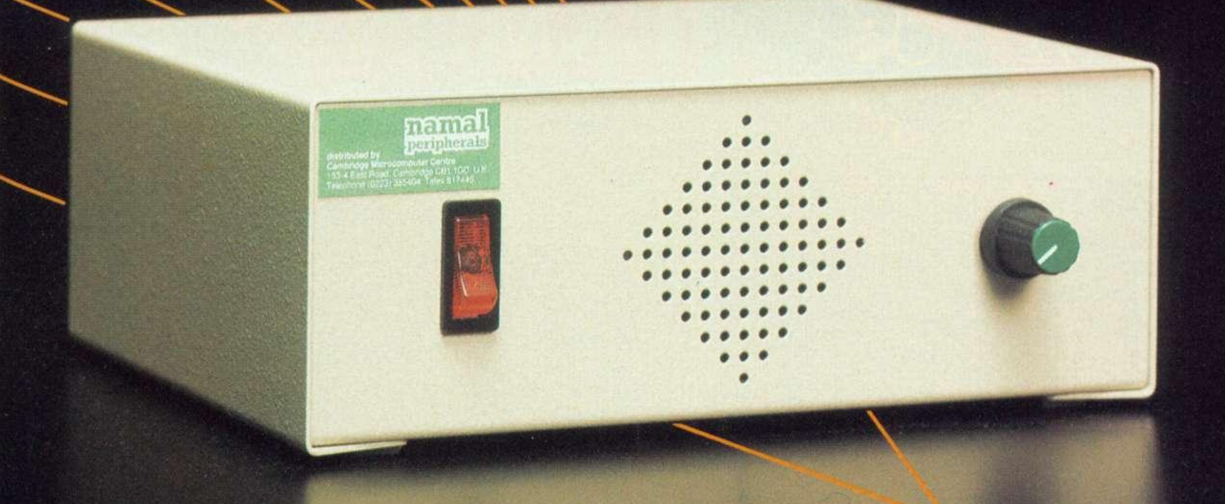
Name: ____________________

Address: ____________________

Barclay/Access: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Prices and specifications correct at time of going to press: we do reserve the rig[ht] however to change without prior notice.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).



TYPE & TALK
Speech Computer

FEATURES

- Instant conversion of typed ASCII text into speech
- Number pronouncing facility including £, $ and arithmetic
- Adjustable speed of speech
- Unlimited vocabulary
- Four inflexion levels
- Variable delay time between spoken phrases
- Selectable between phoneme mode/direct text to speech mode

SPECIFICATIONS

CPU	Z80
ROM	8K
RAM	2K
Speech chip	SC01A
Interfaces	Centronics, Serial RS232 or 423
Baud rate	Selectable from 50 to 9600
Audio output	500 m W
Output impedance	8 ohm
Power requirements	220 V, 240 VAC, 50/60 HZ
Power consumption	20 VA
Dimensions	282(L) X 95(H) X 230 (W) mm
Weight	2 kg

Dealer enquiries welcome

OEM enquiries invited

Manufactured by:
Cambridge Microcomputer Centre
153-54 East Road, Cambridge CB1 1DD
Tel: (0223) 355404 Telex: 817445

REAL VALUE FOR MONEY!
- **Retailing at US $200.00**
- **Generous dealer discount for quantity order.**

Cambridge
Microcomputer
Centre

THE PIONEER BRITISH SPEECH COMPUTER



SERIOUS SOFTWARE

FOR THE B.B.C. MICRO AND ELECTRON

From BEEBUGSOFT

B.B.C. only

MUROM

The BBC Micro sound facilities have a lot of potential, MUROM will help you exploit this to the full.

```
MUROM CHANNEL EDITOR

       CHANO   CHAN 1     CHAN 2     CHAN 3
         2       2 1        3 5        0 0
NOTE   T E L   N O E L    N O E L    N O E L

0008   S - -   C#1 1 0    F#0 5 4    SSS - -
0009   S - -   D#1 1 0    WWW - -    SSS - -
0010   S - -   E 1 1 1    WWW - -    SSS - -
0011   S - -   WWW - -    WWW - -    SSS - -
0012   S - -   A#1 1 0    WWW - -    SSS - -
0013   S - -   B 1 1 0    WWW - -    SSS - -
0014   S - -   D#1 1 0    D#3 5 1    SSS - -
0015   S - -   D#2 1 0    WWW - -    SSS - -
0016   S - -   F 2 1 1    SSS - -    SSS - -
0017   S - -   SSS - -    SSS - -    SSS - -
0018   S - -   SSS - -    SSS - -    SSS - -
0019   S - -   SSS - -    SSS - -    SSS - -
0020   S - -   SSS - -    SSS - -    SSS - -
0021   S - -   SSS - -    SSS - -    SSS - -
0022   S - -   SSS - -    SSS - -    SSS - -
0023   S - -   SSS - -    SSS - -    SSS - -
0024   S - -   SSS - -    SSS - -    SSS - -
0025   S - -   SSS - -    SSS - -    SSS - -
```

Create your own tunes and sound sequences with ease, either with MUROM'S editor and a musical score or by using the Beeb to simulate a piano keyboard. Edit your creations with the full screen music editor. Then switch to the envelope editor to tailor the tonal quality and select instrument type. Alternatively select one of the predefined instrument envelopes.

Incorporate your music and sound sequences into any program of your own, to play back with or without MUROM plugged in. Playback is interrupt driven and may continue even while you run other programs.

Predefined instrument envelopes may be set up, e.g. *FLUTE, *SYNTH etc.

Instant sound effects may be called from Basic, e.g. *ZAP, *SIREN, *EXPLODE etc.

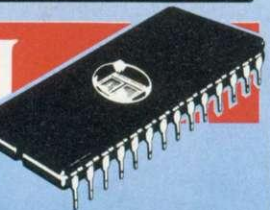
MUROM is accompanied by a full instruction manual and repertoire of music data on cassette.

COMMAND SUMMARY

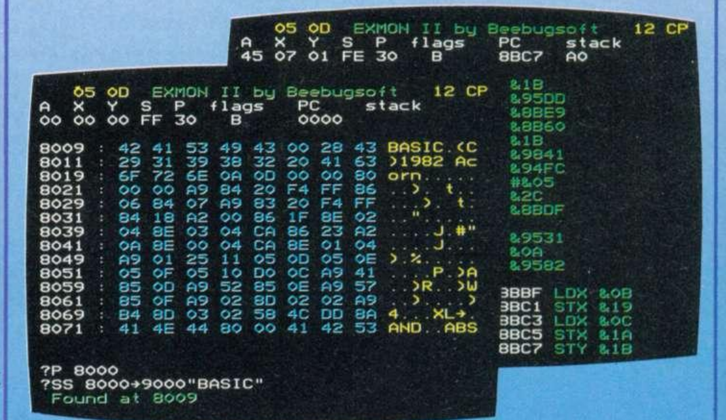
*PLAY	Calls the variable speed, interrupt driven playback routine.
*DISP	Mode 7 display of tune playing.
*TEMPO	Alter tempo.
*KEYB	Use BBC keyboard as a piano keyboard.
*SCORE	Call up full screen music editor.
EDITOR SUB-COMMANDS:	
MODE	Change from editing a single channel to editing all channels consecutively.
GO	Move editor to any note in score.
PLAY	Enable single stepping of music.
OCTV	Change octave of any channel.
ENVL	Change envelope of any channel.
LOAD	Load previously created music.
SAVE	Save edited score to disc or cassette.
KEY	Toggle note entry between note name and keyboard position.
*ENVLP	Sound envelope editor.
*FLUTE,	*SYNTH . . . etc. ten predefined envelopes.
*EXPLODE,	*ZAP . . . etc. ten predefined effects.
*TRANS	Transpose up or down by a number of semitones.
*MONOC	Disable colour output for monochrome screens.

B.B.C. & Electron

EXMON II



EXTENDED MACHINE CODE MONITOR NOW WITH DUAL SCREENS



60 New Commands for debugging and developing machine code

Our very popular machine code monitor has been enhanced by the addition of a number of new facilities, including Dual Screen Operation and full screen memory editor.

Now if you are debugging a game, or any other program with a visual display, you can single step through it instruction by instruction and actually watch the effect on the screen.

You can also revert to the monitor screen at the press of a key to examine registers, edit code, read variables, alter memory etc., and then switch back to your display screen and continue running (or single stepping), without losing your display.

Exmon II features include

* 60 machine code commands.
* Full dual screen operation.
* Full screen memory editor, input in hex, Ascii or as assembler instructions.
* Search for hex, or Ascii string, including wildcards.
* Move memory block.
* Verify that two blocks are the same.
* Relocate code to run at another location.
* Fill memory with series of hex bytes or Ascii string.
* Execute all * commands.
* Single step with skip option.
* Up to 10 breakpoints which may even be set in Rom.
* Conditional breakpoints . . . e.g. Break if register X=5.
* User definable work area.

Note: The Electron version does not feature dual screens.



MURDOM £29.00 EXMON II £29.00

Available from your local dealer and selected branches of W.H. SMITH'S

Prices include VAT





ACCESS & BARCLAYCARD ORDERS & ENQUIRIES:
TEL ST. ALBANS (0727) 60263

MAIL ORDER (POST FREE) TO: BEEBUGSOFT, Mailing Dept 13, P.O. Box 109, High Wycombe Bucks.

TOOLKIT ROM from BEEBUGSOFT

BASIC Programmer's Aid for the BBC micro



- **27 new commands to make life easier**
- **Saves hours in program development and debugging**
- **Supports both cassette and disc systems**
- **No command name conflict with other Roms**
- **Ideal for expert and novice alike**
- **Fitting instructions and a 32 page manual supplied**
- **You'll wonder how you ever managed without it**

SPECIAL FEATURES INCLUDE

SCREEN EDITOR An extremely powerful editor, allowing the use of cursor keys to list a program line-by-line in either direction and move to any part of a program to overtype or insert new code and corrections.

```
Editing lines 5 to 1470

    1 String search
    2 Search and replace
    3 Move lines
    4 List procedures and functions
    5 List A% to Z%
    6 List numeric variables
    7 List string variables
    8 List arrays
    9 Change edit range
    0 Edit program

    ESCAPE to exit

 Enter option: 1
Search string:  X%

  640 DEFPROCEVAL(U%,V%,W%, X% ,Y%)
  670 IFB%< X% A%=U%+2:ENDPROC
 1450 LOCAL X% ,Y%
 1460 $buf%=cmand$: X% =buf%:Y%=buf%DIV2
56

 Enter option: _
```

ERROR DETECTION Powerful facility to trap an error in a Basic program as it runs. It will then automatically enter the Screen Editor, display the line in error and position the cursor close to the statement at fault.

"TOOLKIT is an essential utility for all Basic programmers using the BBC Micro. . . .an indispensable aid packed full of powerful utilities."
EDUCATIONAL COMPUTING MARCH 1984

". . . highly recommended,"
PCN MARCH 17 1984

"The Beebugsoft Toolkit costs £27 and in my opinion is worth every penny. Since it has been installed in my BBC it has been used extensively and I can find no fault with it. Highly recommended to lazy programmers!"
COMPUTING TODAY JUNE 1984

COMMANDS

*CHECK	Verify a program or data in memory with disc/cassette.
*CLEAR	Clear all variables including integers.
*EDIT	Enter full screen editor.
*FREE	Display free memory and pseudo variables.
*HELP INFO	Display a screenful of useful system information.
*MEMORY	Display memory contents.
*MERGE	Merge a program in memory with one on disc/cassette.
*MOVE	Move program to run at specified address.
*NEW	As NEW, but can be issued from within a program.
*OFF	Cancel enhanced error handling.
*OLD	As OLD, but can be issued from within a program.
*ON	Auto error handling – enters editor at line in error.
*PACK	Efficient program compactor.
*RECOVER	Intelligently recover bad programs.
*RENUMBER	Allow partial renumbering.
*REPORT	Extended error reporting facility.
*SCREEN	Screen dump to cassette or disc.
*UTIL	Display utilities menu.
*UTIL 1	String search.
*UTIL 2	String search and replace.
*UTIL 3	Move Basic program lines.
*UTIL 4	List procedures and functions.
*UTIL 5	List values of A% to Z%.
*UTIL 6	List numeric variables.
*UTIL 7	List string variables.
*UTIL 8	List names of arrays.
*UTIL 9	Set up range for utilities 1 and 2.

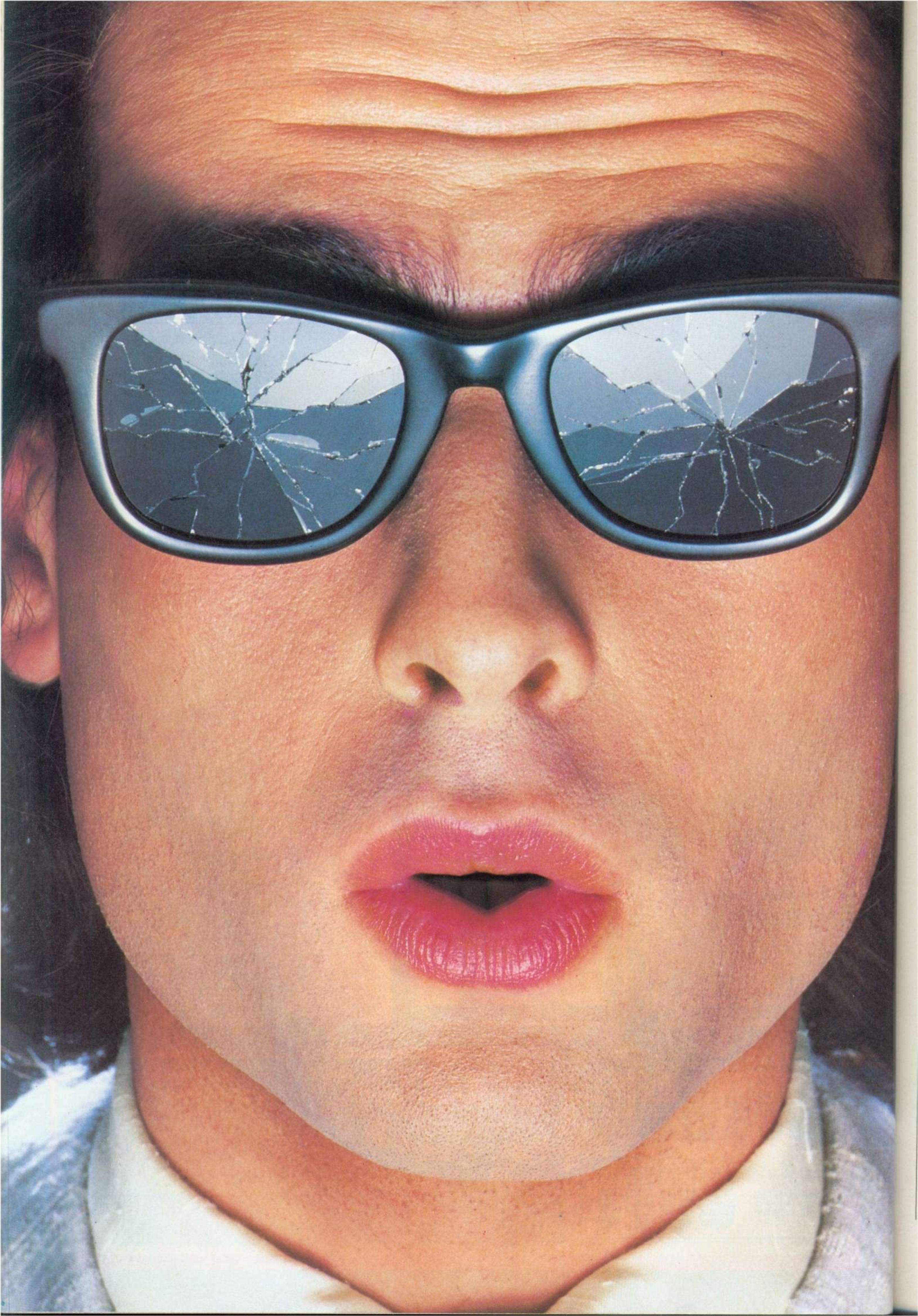


PRICE **£27.00** INC. VAT
Available from your local dealer and selected branches of W.H. SMITH'S



Access Orders and enquiries: Tel: ST. ALBANS (0727) 60263

Mail order (Post Free) to:
BEEBUGSOFT, Mailing Dept. 13 P.O. Box 109, High Wycombe, Bucks.



You should see what he's just seen.

Micronet 800.

Stretching the mind of your micro far beyond its limits.

Micro evolution continues with this unique communications, information and software system. Set on our mainframes nationwide.

Includes 30,000 pages and access to Prestel™ with its full range of services.

A tremendous Communications section that networks you to thousands of other members across the country. Send and receive electronic messages and graphics at a touch of a button.

And there's the Chatline service, Swapshop and Teleshopping.

Check with daily updates on the very latest computer news.

Micronet also has its own huge facts data base.

And a choice of up-to-the-minute software to download absolutely free.

For only £13 a quarter and just a local° telephone call whenever you want to connect up (that's only 22p per half hour at cheap rates) you could be part of Micronet.

The only accessory you need is a Modem.

A small price to pay to join the other visionaries on this exciting new system.

micronet 800

Fill in the coupon for more details and send to Micronet 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ.

But be warned, Micronet 800's features are almost limitless and constantly updating. So maybe you'd be better to call in at Laskys, John Lewis, main Boots or your local Micronet 800 Action Station.

To feast your eyes on all the amazing things it can do.

To: MICRONET 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ. Telephone 01-278 3143.
Please send me the full facts about Micronet 800.

Name ____________

Make/Model of Micro ____________

Address ____________

____

____

Telephone ____________ AU5

°For 97% of telephone users.
™Prestel is a trademark of British Telecommunications.

On Prestel

See Micronet 800 in action.

AVON

Bath. Boots, 1 Marchants Passage, Southgate. Tel: 0225 64402.
Bristol. Avon Computer Rentals, 16 West Street, Old Market. Tel: 0272 550600.
Bristol. Boots, 59 Broadmead. Tel: 0272 293631.
Bristol. Laskys, 16-20 Penn Street. Tel: 0272 20421.
Clevedon. Computer Centre, 12A Old Street, Clevedon. Tel. 0272 879514.

BEDFORDSHIRE

Bedford. Boots, The Harpur Centre, Harpur Street. Tel: 0234 56231.
Dunstable. Dormans, 7-11 Broad Walk. Tel: 0582 38302.
Leighton Buzzard. Datasine, 59 North Street. Tel: 0525 374200.
Leighton Buzzard. Milton Keynes Music & Computers, 17 Bridge Street. Tel: 0525 382504.
Luton. Hobbyte, Unit 16, The Arndale Centre. Tel: 0582 457195.
Luton. Terry More, 49 George Street. Tel: 0582 23391.

BERKSHIRE

Slough. MV Games, 245 High Street. Tel: 75 21594.

BUCKINGHAMSHIRE

Bletchley. RAMS Computer Centre, 117 Queensway. Tel: 0908 647744.
Chesham. Reed Photo & Computers, 113 High Street. Tel: 0494 783373.

CAMBRIDGESHIRE

Cambridge. Boots, 65-67 Sidney Street and 28 Petty Curry Street. Tel: 0223 350213
Cambridge. Cambridge Computer Store, 4 Emmanuel Street. Tel: 0223 358264
Cambridge. Logic Sales, Unit 6, Midgate Parade, Peterborough. Tel: 0733 49696.
Peterborough. Boots, 40-42 Bridge Street, Queensgate. Tel: 0733 65352.

CHESHIRE

Chester. Boots, 47-55 Foregate Street. Tel: 0244 28421
Chester. Computer Link, 21 St. Werburgh Street. Tel: 0244 316516.
Chester. Laskys, 7 The Forum, Northgate Street. Tel: 0244 317667.
Crewe. Midshires Computer Centre, 68-78 Nantwich Road. Tel: 0270 211086
Ellesmere Port. RFR TV & Audio, 1 Pooltown Road, Whitby. Tel: 051-356 4150.
Hyde. C Tech Computers, 184 Market Street. Tel: 061-366 8223.
Macclesfield. Camera Computer Centre, 118 Mill Street. Tel: 0625 27468
Macclesfield. Computer Centre, 68 Chestergate. Tel: 0625 618827.
Marple. Marple Computer Centre, 30-32 Market Street. Tel: 061-427 4328
Stockport. National Micro Centres, 36 St Petersgate. Tel: 061-429 8080
Widnes. Computer City, 78 Victoria Road. Tel: 051-420 3333.
Wilmslow. Wilmslow Micro Centre. 62 Grove Street. Tel: 0625 530890.

CLEVELAND

Middlesbrough. Boots, 88-90 Linthorpe Road, The Cleveland Centre. Tel: 0642 249616.

CUMBRIA

Kendal. The Kendal Computer Centre, Stramongate. Tel: 0539 22559.
Penrith. Penrith Communications. 14 Castlegate. Tel: 0768 67146.
Whitehaven. P D Hendren, 15 King Street. Tel: 0946 2063.
Workington. Technology Store, 12 Finkle Street. Tel: 0900 66972.

DERBYSHIRE

Alfreton. Gordon Harwood, 67-71 High Street. Tel: 0733 836781.
Chesterfield. Boots, 35-37 Low Pavement, Market Place. Tel: 0246 203591.
Chesterfield. Computer Stores, 14 Stephenson Place. Tel: 0246 208802.
Derby. Boots, 1 Devonshire Walk. Tel: 0322 45886.

DEVON

Exeter. Boots, 251 High Street, Tel: 0392 32244.
Exeter. Open Channel, Central Station, Queen Street. Tel: 0392 218187.
Paignton. Computer Systems Ltd, 35 Hyde Road. Tel: 0803 524284.
Plymouth. Syntax, 76 Cornwall Street. Tel: 0752 28705.
Seaton. Curtis Computer Services, Seaton Computer Shop, 51c Harbour Road. Tel: 0297 22347.
Tiverton. Actron Microcomputers, 37 Bampton Street. Tel: 0884 252854.

DORSET

Bournemouth. Lansdowne Computer Centre, 1 Lansdowne Crescent, Lansdowne. Tel: 0202 20165.
Dorchester. The Paper Shop, Kings Road. Tel: 0305 64564.
Poole. Lansdowne Computer Centre, 14 Arndale Centre. Tel: 0202 670901.

ESSEX

Basildon. Basildon Software Centre, 78-80 Liberty Shopping Hall, East Square. Tel: 0268 27922.
Braintree. Mirage Microcomputers Ltd, 24 Bank Street. Tel: 0376 48321.
Chelmsford. Maxton Hayman, 5 Bromfield Road. Tel: 0245 354595.
Chelmsford. Way In Computers, 7 Village Square, Chelmer Village. Tel: 0245 467858.
Colchester. Boots, 5-6 Lion Walk. Tel: 0206 577303.
Colchester. Colchester Computer Centre, 3a Short Wyre Street. Tel: 0206 47242.
Grays. H. Reynolds, 28a Southend Road. Tel: 0375 31641.
Harlow. Harlow Computer Centre, 17 Staple Tye. Tel: 0279 22846.
Hornchurch. Comptel Computer Systems, 112a North Street. Tel: 0402 446741.
Ilford. Boots, 177-185 High Road. Tel: 01-553 2116.
Romford. Software Plus, 72 North Street. Tel: 70 65271.
Southend-on-Sea. Computerama, 88 London Road. Tel: 0702 335443.
Southend-on-Sea. Computer Centre, 336 London Road. Tel: 0702 337161.
Southend-on-Sea. Estuary Personal Computers, 318 Chartwell North, Victoria Circus Shopping Centre. Tel: 0702 614131.

GLOUCESTER

Cheltenham. Laskys, 206 High Street. Tel: 0242 570282.
Cheltenham. Screen Scene, 144 St. Georges Road. Tel: 0242 528979.
Gloucester. Boots, 38-46 Eastgate Street. Tel: 0452 423501.

HAMPSHIRE

Basingstoke. Fishers, 2-3 Market Place. Tel: 0256 22079.
Southampton. Business Electronics, Micromagic At Atkins, 7 Civic Centre Road. Tel: 0703 25903.
Waterlooville. GB Microland, 7 Queens Parade, London Road. Tel: 0705 259911.

HERTFORD

Hitchin. County Computers, 13 Bucklesbury. Tel: 0462 36757.
Potters Bar. the Computer Shop, 107 High Street. Tel: 0707 44417.
Stevenage. DJ Computers, 11 Town Square. Tel: 0438 65501.
Watford. SRS Microsystems, 94 The Parade, High Street. Tel: 0923 26602.
Watford. Watford Electronics, Cardiff Road. Tel: 0923 405588.
Welwyn Garden City. DJ Computers, 40 Fretherne Road. Tel: 96 28444.

HUMBERSIDE

Beverley. Computing World, 10 Swabys Yard, Dyer Lane. Tel: 0482 881831.

KENT

Ashford. DGH, 10 North Street. Tel: 0233 32597.
Ashford. Geerings of Ashford, 80 High Street. Tel: 0233 33366.
Bromley. Boots, 148-154 High Street. Tel: 01-460 6688.
Bromley. Computers Today. 31 Market Square. Tel: 01-290 5652.
Bromley. Walters Computers, Army & Navy, 64 High Street. Tel: 01-460 9991.
Chatham. Boots, 30-34 Wilmott Square, Pentagon Centre. Tel: 0634 405471.
Gravesend. Gravesend Home Computers, 39 The Terrace. Tel: 0474 23871.
Gillingham. Regal Software Supplies, 49 High Street. Tel: 0634 579634.
Maidstone. Kent Micros, 51 Union Street. Tel: 0622 52784.
Rainham. Microway Computers, 39 High Street. Tel: 0634 376702.
Sevenoaks. Ernest Fielder Computers, Dorset Street. Tel: 0732 456800.
Shortlands. The Village House of Computers, 87 Beckenham Lane. Tel: 01-460 7122.
Sittingbourne. Computer Plus, 65 High Street. Tel: 0795 25677.
Tunbridge Wells. Modata Computer Centre, 28-30 St. Johns Road. Tel: 0892 41555.

LANCASHIRE

Blackburn. Tempo Computers, 9 Railway Road. Tel: 0254 691333.
Blackpool. Blackpool Computers Store, 179 Church Street. Tel: 0253 20239.
Burnley. IMO Business Systems, 39-43 Standish Street. Tel: 0282 54299.
Preston. 4Mat Computing, 67 Friargate. tel: 0772 561952.
Preston. Laskys, 1-4 Guildhall Arcade. Tel: 0772 59264.
Wigan. Wildings Computer Centre, 11 Mesnes Street. Tel: 0942 22382.

LEICESTERSHIRE

Leicester. Boots, 30-36 Gallowtree Gate. Tel: 0533 21641.
Market Harborough. Harborough Home Computers, 7 Church Street. Tel: 0858 63056.

LONDON

W1. Computers of Wigmore Street, 104 Wigmore Street. Tel: 01486 0373.
W1. Laskys, 42 Tottenham Court Road. Tel: 01-636 0845.
W1. Lion House, 227 Tottenham Court Road. Tel: 01-637 1601.
W1. Sonic Foto Micro Center, 256 Tottenham Court Road. Tel: 01-580 5826.
W1. Tomorrows World Today, 27 Oxford Street. Tel: 01-439 7799.
W1. Walters Computers, DH Evans, Oxford Street. Tel: 01-629 8800.
WC1. Transam Micro Systems, 59-61 Theobalds Road. Tel: 01-405 5240.
W5. Laskys, 18-19 Ealing Broadway Shopping Centre. Tel: 01-567 4717.
W8. Walters Computers, Barkers, Kensington High Street. Tel: 01-937 5432.
SE7. Vic Oddens Micros, 5 London Bridge Walk. Tel: 01-403 1988.
SE9. Square Deal, 373-375 Footscray Road, New Eltham. Tel: 01-859 1516.
SE15. Castlehurst Ltd, 152 Rye Lane, Peckham. Tel: 01-639 2205.
EC2. Devron Computer Centre, 155 Moorgate. Tel: 01-638 3339.
N14. Logic Sales, 19 The Bourne, The Broadway, Southgate. Tel: 01-882 4942.
N22. Boots, 38-40 High Road, Wood Green. Tel: 01-881 0101.
NW3. Maycraft Micros, 58 Rosslyn Hill, Hampstead. Tel: 01-431 1300.
NW4. Davinci Computer Store, 112 Brent Street, Hendon. Tel: 01-202 2272.
NW7. Computers Inc, 86 Golders Green. Tel: 01- 209 0401.
NW10. Technomatic, 17 Burnley Road, Wembley. Tel: 01-208 1177.

MANCHESTER

Bolton. Computer World UK Ltd, 208 Chorley Old Road. Tel: 0204 494304.
Manchester. Boots, 32 Market Street. Tel: 061-832 6533.
Manchester. Laskys, 12-14 St. Marys Gate. Tel: 061-833 0268.
Manchester. Mighty Micro, Sherwood Centre, 268 Wilmslow Road, Fallowfield. Tel: 061-224 8117.
Manchester. NSC Computer Shops, 29 Hanging Ditch. Tel: 061-832 2269.
Manchester. Walters Computers, Kendal Milne, Deansgate. Tel: 061-832 3414.
Oldham. Home & Business Computers, 54 Yorkshire Street. Tel: 061-633 1608.
Swinton. Mr Micro, 69 Partington Lane. Tel: 061-728 2282.

MERSEYSIDE

Heswall. Thornguard Computer Systems, 46 Pensby Road. Tel: 051-342 7516.
Liverpool. Hargreaves, 31-37 Warbreck Moor, Walton. Tel: 051-525 1782.
Liverpool. Laskys, Dale Street. Tel: 051-236 3298.
St. Helens. Microman Computers, Rainford Industrial Estate, Mill Lane Rainford. Tel: 0744 885242.
Southport. Central Studios, 38 Eastbank Street. Tel: 0704 31881.

MIDDLESEX

Enfield. Laskys, 44-48 Palace Garden Shopping Centre. Tel: 01-363 6627.
Harrow. Camera Arts, 42 St. Anns Road. Tel: 01-427 5469.
Harrow. Harrow Micro, 24 Springfield Road. Tel: 01-427 0098.
Hounslow. Boots, 193-199 High Street. Tel: 01-570 0156.
Southall. Twillstar Computers Ltd, 7 Regina Road. Tel: 01-574 5271.
Teddington. Andrews, Broad Street. Tel: 01-997 4716.
Twickenham. Twickenham Computer Centre, 72 Heath Road. Tel: 01-892 7896.
Uxbridge. JKL Computers, 7 Windsor Street. Tel: 0895 51815.

NORFOLK

Norwich. Adams, 125-129 King Street. Tel: 0603 22129.

NOTTINGHAMSHIRE

Sutton in Ashfield. HN & L Fisher, 87 Outram Street. Tel: 0623 54734.

OXFORDSHIRE

Abingdon. Ivor Fields Computers, 21 Stern Street. tel: 0235 21207.
Banbury. Computer Plus, 2 Church lane. Tel: 0295 55890.
Oxford. Absolute Sound & Video, 19 Old High Street, Headington. Tel: 0865 65661.
Oxford. Science Studio, 7 Little Clarendon Street. Tel: 0865 54022.

SCOTLAND

Aberdeen. Boots, 133-141 Union Street. Tel: 0224 585349.
Edinburgh. Boots, 101-103 Princes Street. Tel: 031-225 8331.
Glasgow. Boots, 200 Sauchiehall Street. Tel: 041-332 1925.
Glasgow. Boots, Union Street and Argyle Street. Tel: 041-248 7387.
Glasgow. Tom Dixon Cameras, 15-17 Queen Street. Tel: 041-204 0826.

SHROPSHIRE

Shrewsbury. Clairmont Enterprises, Hills Lane. Tel: 3647 52949.
Shrewsbury. Computerama, 13 Castlegate. Tel: 0743 60528.
Telford. Computer Village Ltd, 2/3 Hazeldine House, Central Square. Tel: 0952 506771.
Telford. Telford Electronics, 38 Mall 4. Tel: 0952 504911.

STAFFORDSHIRE

Newcastle-under-Lyme. Computer Cabin, 24 The Parade, Silverdale. Tel: 0782 636911.
Stafford. Computerama, 59 Foregate Street. Tel: 0785 41899.
Stoke-on-Trent. Computerama, 11 Market Square Arcade, Hanley. Tel: 0782 268524.

SUFFOLK

Bury St. Edmunds. Boots, 11-13 Cornhill. Tel: 0284 701516.
Bury St. Edmunds. Suffolk Computer Centre, 1-3 Garland Street. Tel: 0284 705503.

SURREY

Bagshot. P & H Electronics, 22-24 Guildford Road. Tel: 0276 73078.
Croydon. Laskys, 77-81 North End. Tel: 01-681 8443.
Croydon. The Vision Store, 53-59 High Street. Tel: 01-686 6362.
Croydon. The Vision Store, 96-98 North End. Tel: 01-681 7539.
South Croydon. Concise Computer Consultants, 1 Carlton Road. Tel: 01-681 6842.
Epsom. The Micro Workshop, 12 Station Approach. Tel: 0372 721533.
Guildford. Walters Computers, Army & Navy, 105-111 High Street. Tel: 0483 68171.
Wallington. Surrey Micro Systems, 53 Woodcote Road. Tel: 01-647 5636.
Woking. Harpers, 71-73 Commercial Way. Tel: 0486 225657.

SUSSEX

Bexhill-on-Sea. Computerware, 22 St. Leonards Road. Tel: 0424 223340.
Brighton. Boots, 129 North Street. Tel: 0273 27088.
Brighton. Gamer, 71 East Street. Tel: 0273 728681.
Brighton. Laskys, 151-152 Western Road. Tel: 0273 725625.
Crawley. Gatwick Computers, 62 The Boulevard. Tel: 0293 37842.
Crawley. Laskys, 6-8 Queensway. Tel: 0293 544622.
Eastbourne. Boots, 15 Eastbourne Arndale Centre. Tel: 03232 7742.

TYNE & WEAR

Newcastle-upon-Tyne. Boots, Eldon Square. Tel: 0632 329844.
Newcastle-upon-Tyne. Laskys, 6 Northumberland Street. Tel: 0632 617224.
Newcastle-upon-Tyne. RE Computing, 12 Jesmond Road. Tel: 0632 815580.

WALES

Aberdare. Inkey Computer Services, 70 Mill Street, The Square, Trecynon. Tel: 0685 881828.
Aberystwyth. Aberdata at Galloways, 23 Pier Street. Tel: 0970 615522.
Cardiff. Boots, 26 Queens Street & 105 Frederick Street. Tel: 0222 31291.
Cardiff. Cardiff Microcomputers, 46 Charles Street. Tel: 0222 373072.
Cardiff. The Computer Shop, 41 The Hayes. Tel: 0222 26666.
Cardiff. Laskys, 32-36 Town Wall, St. Davids Centre. Tel: 0222 41619.
Cardiff. Randall Cox, 18/22 High Street Arcade. Tel: 0222 397162.
Mold. Clwyd Personal Computers, Unit 19, Daniel Owen Precinct. Tel: 0352 56842.
Newport. Gwent Computers, 92 Chepstow Road. Tel: 0633 841760.
Swansea. Boots, 17 St. Marys Arcade, The Quadrant Shopping Centre. Tel: 0792 43461.
Swansea. The Microstore, 35-36 Singleton Street. Tel: 0792 467980.

WARWICKSHIRE

Coventry. Coventry Micro Centre, 33 Far Gosford Street. Tel: 0203 58942.
Coventry. Impulse Computer World, 60 Hertford Street Precinct. Tel: 0203 553701.
Coventry. JBC Micro Services, 200 Earlsdon Avenue, North Earlsdon. Tel: 0203 73813.
Coventry. Laskys, Lower Precinct. Tel: 0203 27712.
Leamington Spa. IC Computers, 43 Russell Street. Tel: 0926 36244.
Leamington Spa. Leamington Hobby Centre, 121 Regent Street. Tel: 0926 29211.
Nuneaton. Micro City, 1a Queens Road. Tel: 0203 382049.
Rugby. O.E.M., 9-11 Regent Street. Tel: 0788 70522.

WEST MIDLANDS

Birmingham. Boots, City Centre House, 16-17 New Street. Tel: 021-643 7582.
Birmingham. Laskys, 19-21 Corporation Street. Tel: 021-632 6303.
Dudley. Central Computers, 35 Churchill Precinct. Tel: 0384 238169.
Stourbridge. Walters Computer Systems. 12 Hagley Road. Tel: 0384 370811.
Walsall. New Horizon, 1 Goodall Street. Tel: 0922 24821.
West Bromwich. DS Peakman, 7 Queens Square. Tel: 021-525 7910.

YORKSHIRE

Bradford. Boots, 11 Darley Street. Tel: 0274 390891.
Leeds. Boots, 19 Albion Arcade, Bond Street Centre. Tel: 0532 33551.
Sheffield. Laskys, 58 Leopold Street. Tel: 0742 750971.
York. York Computer Centre, 7 Stonegate Arcade. Tel: 0904 641862.



TECHNOMATIC

MAY '85

BBC Computer & Econet Referral Centre

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

305 Edgware Road, London W2 Tel: 01-723 0233

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and 15% VAT to order value

ACORN COMPUTER SYSTEMS

BBC Model B	£299(a)
BBC Model B + DFS	£346(a)
BBC Model B + Econet	£335(a)
BBC Model B + Econet + DFS	£399(a)
ACORN 10Mbyte Hard Disc	£1300(a)
BBC Dust Cover	£4(d)
BBC Carrying Case	£12(b)

UPGRADE KITS

A to B	£55 (d)	1.2 O/S Rom	£7.50 (d)
Acorn DFS Kit	£89 (d)	DNFS Rom	£17.50 (d)
Econet Kit	£55 (d)	4816AP RAM	£1.50 (d)

Basic II Rom with User Guide....... £22.50 (d)
1.2 O/S Rom....... £7.50 DNFS Rom....... £17.50
4816AP Memory upgrade RAM (each) £2.00



We are pleased to announce the launch of our on-line information system. Pages available will include:

- *New Products *Comment Box
- *Technical Pages *Comments on Stock and availability of Products
- *Placing of Orders and many others. . . .

Techno-Line 01-452 1500
Weekdays: 18.30 to 09.30
Sunday: 24 hours

Technical Information: Automatic V21/V23 for both 300/300 and 1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)	Printer Server Rom	£41 (d)
File Server Level I	£75 (d)	10 Station Lead Set	£26 (c)
File Server Level II	£210 (d)	Adv. Econet User Guide	£10 (d)

ACORN BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 48 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value. £325(a)

ACORN's multiplotter driver for Bitstick graphics. £79(c)
(All popular plotters included)
Epson FX80 screen dump routine for Bit Stick. £35 (d)

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1 Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

10 Mbyte Winchester Drive £1300 (a)
30 Mbyte Winchester Drive £1999 (a)
Add £200 to the cost if File Server Level III is to be installed.

ACORN Z80 2nd Processor

This processor converts your BBC into a CP/M based business micro providing it with computing power a professional would need. The free software package supplied includes three office productivity programs (word processor, spreadsheet and a database), NUCLEUS report generator, a business program ACCOUNTANT plus three programming languages and comprehensive manuals. All for only £348 (a)

See our section on CP/M software for other packages available for use with this processor.

ACORN 6502 2nd Processor

This processor is designed for the serious computer user who wants to get even more out of his micro. It increases memory by upto 44K for BASIC programs and upto 60K for assy. lang. programs regardless of the screen mode (Ideal for VIEW and WW+). Programs run upto 50% faster. This combination offers computing power of systems costing twice as much. £175 (a)

ACORN P-SYSTEM

NEW

The long-awaited-for portable operating system has arrived. Intended for use with the 6502 Second processor, this portable operating system is a complete implementation and comes complete with a Filer, Editor, and compilers for two languages, USCD PASCAL and FORTRAN-77. Widely used in universities and colleges, as well as being popular with business software authors, P-System is user-friendly, offering ease of program development as well as portability. £263(b)

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. With 256K RAM and single/dual drives, it simply connects through the 1MHz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the free Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.

(This highly acclaimed software is now available for the IBM PC at a cost of over £400!)

G800/2: £999(a)

OTHER TORCH PRODUCTS

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic	£275 (a)
Z80 Disc Pack ZDP240 with software as above	£650 (a)
20Mb Hard Disc + 1 × 400K Floppy Drive	£1,950 (a)
Unicorn 68000, Unix OS/Z80B/512K, 20MB Hard Disc, 400K Floppy	£3495 (a)

TECHTEL 'IN-HOUSE' INFORMATION CENTRE

A unique concept that allows you to provide information in public places. A member of the public is able, without assistance, to view information about your products or services.

Techtel is a complete package allowing you, in conjunction with a BBC and disc drive, to set up an in-house 'Viewdata' type information system. The friendly software package will allow you to set up a 'Prestel' type database of up to 700 pages, (depending on drive) containing both graphics and text. This menu-driven database could hold details of products or services supplied by your company. Typical user would be any company needing to pass information to the public e.g. banks, dept. stores, hotels, travel & estate agents etc. etc.

The package also includes a 'carousel' type display, allowing each frame to be displayed for a specified time, before moving on to the next frame.

A unique facility of Techtel is its 'through-glass' keyboard. Its special numeric keyboard can be placed inside a shop window, yet may be used by customers outside — thus allowing the unit to be left unattended.

The package includes the special keypad, Teletext Loader and Editor, and full instructions. £175(b)

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

* Epson Compatible Control codes * 80 or 156 Column
* NEAR LETTER QUALITY Print using 23 x 18 matrix
* Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
* Dot Addressable graphics in various modes
* 3K buffer which can also hold user defined characters
* Extra ROM/RAM socket for custom print fonts
* Friction & Tractor feed with built in paper roll holder

KP810 (80 column) **£255 (a)** KP910 (156 column) **£349 (a)**

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T **£210 (a)** RX80FT **£220 (a)** RX100 **£345 (a)**
FX80 **£315 (a)** FX100 **£430 (a)**

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions. **£99(d)**

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Proportional spacing * Underline * * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 **£325(a)**

JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 **£325(a)**

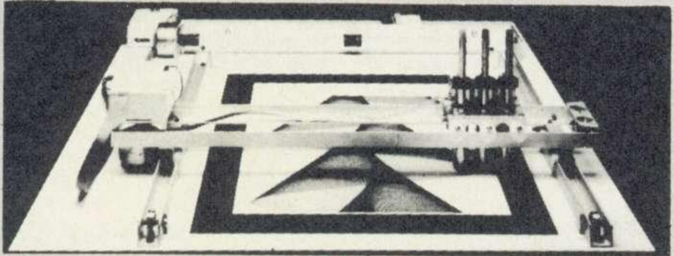
VIEW & VIEWSHEET PRINTER DRIVER GENERATOR

This printer driver generator comes with predefined drivers for EPSON FX80, JUKI 6100 and lets you generate printer driver for any BBC compatible printer. Gone are the days when you had to buy dedicated drivers. The screen driver program supplied with it lets you view the text as it is going to appear on the paper including the bold, italics, underlined characters etc. Supplied on disc. **£10(d)**

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete all accessories.

Workstation Complete £490(a)



Basic Plotter £270(a)

Opto Sensor **£72(c)** Drill/Router Attachment **£79(c)**
Power Supply: PS12V **£42(c)** PS24V **£78(c)**
Scandump Utility Disc **£14.95 (d)**

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
Paper Roll Holder **£17(d)** FX80 Tractor Attachment **£37(c)**.
Interfaces: 8143 RS232 **£28(c)**; 8148 RS232 + 2K **£57(c)**;
8132 Apple II **£60(c)**; 8165 IEEE + Cable **£65(c)**.
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 **£5.00(d)**; RX/FX/MX 100 **£10(d)**;
FX80 Dustcover **£4.50(d)**

KAGA TAXAN: RS 232 Interface + 2K buffer **£78(c)**; Ribbon KP810/910 **£6(d)**

JUKI: RS232 Interface **£65(c)**; Spare Daisy Wheel **£14(d)**; Ribbon **£2.50(d)**;
Sheet Feeder **£182(a)** Tractor Feed Attach **£129(a)**

BROTHER HR15: Sheet Feeder **£189(a)** **Ribbons Carbon or Nylon** **£4.50(d)**

BBC Printer Lead: Parallel (42") **£7(d)**; Serial **£7(d)**
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 sheets 9.5" x 11" **£13(b)** 2000 sheets 14.5" x 11" **£18.50(b)**
Labels per 1000s: Single Row 3½" x 1 7/16" **£5.25(d)**
Triple Row 2-7/16" x 1 7/16" **£5.00(d)**

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. **£399 (a)**

PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer **£245(a)**
BBC Cable Set **£30**

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 **£69(c)**	25V25-3 **£64(c)**
4 Computers to a Printer	36V36-4 **£85(c)**	25V25-4 **£74(c)**
2 Computers/2 Printers X-over	36V36-X **£69(c)**	25V25-X **£69(c)**
BBC Cable Set 3 to 1 (1m ea.)	**£32(c)**	**£34(c)**
BBC Cable Set 4 to 1 (1m ea.)	**£39(c)**	**£41(c)**

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 **£19.50(c)**.

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD package. **£110(b)**.
DDX software **£99(b)**.

01-208 1177

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

14" RGB		with PAL & Audio	
1431 Std Res	£165(a)	1431 AP Std Res	£205(a)
1451 Med Res	£240(a)	1451 AP Med Res	£280(a)
1441 Hi Res	£389(a)	These monitors can receive TV programs thru a Video Recorder	

20" RGB with PAL & Audio

2030CS Std Res	£380(a)	2040CS Hi Res	£685(a)

KAGA TAXAN 12" RGB

VISION II Hi Res £225 (a) VISION III Super Hi Res £325 (a)

SANYO CD3125NB 14" RGB Std Res £169 (a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
PHILIPS DGD Hi Res Green Screen	£75(a)
ZENITH 122 Hi Res 12" Amber Screen	£68(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)

BBC Leads Kaga RGB £5(d) Microvitec £3.50(d) Monochrome £3.50(d)

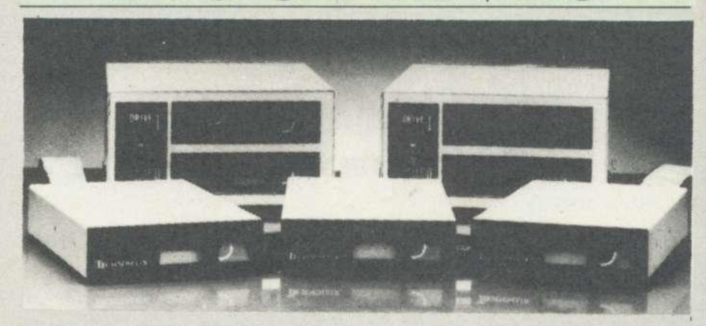
RB2 TRACKER BALL

Marconi with its years of experience making tracker balls for use in Military and Air Traffic Control have developed a quality device for the serious hobbyist, for educational uses, and for low cost CAD/CAM applications. RB2 is a compact, ergonomically designed tracker ball that provides precise positional control and rapid direction changing using a freely rotating resin ball in any direction without the limiting stops or the zero point drift of joystick controls. Three switch buttons enable easy software manipulation to incporate the use of the tracker ball. Appropriate software will enable the RB2 to take over the functions of cursor keys in word processing, CAD/CAM applications and two dimensional positional controls of robots, drillheads etc. RB2 which plugs into the user port is supplied with utility programme to use it as a joystick with other software, a comprehensive graphics/CAD program and a program demonstrating its editing capabilities. User guide includes instructions on writing your own programs for the RB2. £52(b)

AMX MOUSE

In conjunction with a controlling ROM this sophisticated mouse has many advanced features such as Icons, Windows etc., these can be used in ordinary programs as well as sophisticated CAD Design. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £75(b)

DISC DRIVES



TECHNOMATIC disc drives come fitted with high quality slimline Japanese mechanisms and represent the state of art in disc drive technology. They are built to highest standards and are all tested to their full performance capability before packaging. All versions of drives are offered with or without integral power supplies. Power supplies for dual drives are of switch mode type and generously rated. Attractively designed steel casings are painted in hard wearing BBC in matching paint. All dual drives can be supplied in stacked version or with built in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer system installation. All drives can operate in single and double density modes. Drives are supplied with cables, manual and formatting disc and are ready to be fitted to the computer.

Single Drives:				
1 × 100K 40T SS	TS100	£85(b)	PS100 with psu	£125(b)
1 × 400K 80/40T DS	TS400	£125(b)	PS400 with psu	£149(b)
Dual Drives:				
Stacked Version:				
2 × 100K 40T SS	TD200	£175(a)	PD200 with psu	£200(a)
2 × 400K 80/40 DS	TD800	£275(a)	PD800 with psu	£300(a)
Plinth Version:				
2 × 100K 40T SS	TD200P	£195(a)	PD200P with psu	£220(a)
2 × 400K 80T DS	TD800P	£295(a)	PD800P with psu	£315(a)

DISC DRIVE MULTIPLEXER

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard. Mains powered.

TDM 4 Quad Unit (upto 4 computers) £135(a)
TDM 2 Dual Unit (2 computers) £75(b)

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD £15(c) 40 T DSDD £18(c)
80 T SSDD £22(c) 80 T DSDD £24(c)

DISC ACCESSORIES

Single Disc Cable £6(d) Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d) 30 Disc Case £6.00(c)
Lockable Storage Boxes 40 Discs £14(c) 100 Discs £19(c)

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.

Floppiclene with 20 disposable cleaning discs. £14.50(b).

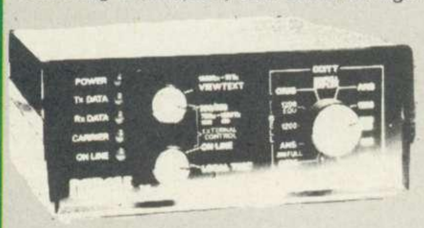
COMMUNICATIONS

MODEMS

ACORN PRESTEL: The official Acorn add-on — an advanced BT Approved. Auto-Dial, Prestel Terminal ideal for British Telecom Gold. Comprehensive software includes 'tagged' frames, downloading of Telesoftware, saving of frames, printing, sophisticated 'Mailbox' handling c/w editor. A built-in speaker allows line monitoring. A simple !BOOT file allows automatic operation **£99(b)**

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as Intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered **£62(c)** BBC Lead **£6** External PSU **£9(c)**

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21,V23,BELL 103/113/108 and including 75,300,600,1200 Baud ratings. (It even includes 'reverse Prestel'!). This is the modem that will cover 'Prestel' type systems as well as Bulletin Boards both in the UK and abroad. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto-dial/auto-answer makes this modem unique. WS2000 **£129(c)** BBC Serial Cable **£7**



WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30(d).**
BBC User Port cable (for modem control) **£7.**
SKI KIT (Allowing total control of the modem by your computer) **£10.**
DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers for autodialling **£10.**
WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DEMON A High Performance, yet low-cost Modem. Features include: Auto-dial & auto-answer, Auto baud rate scan, 75,300,1200 Baud rates with V21, V23 and Bell standards. Sophisticated software in ROM allow many features like: Auto-Dial, Redial, Remote facilities etc. An Auto-Dial disc allows storage of commonly dialled numbers. UNICOM **£49.95(b)** Unicom ROM **£20** Unicom Disc **£9.95** Unicom Cable **£6(d)** Not BT approved

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half-Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. TELEMOD 2 **£65(b)** BBC Lead **£7.00**

COMMSTAR An ideal communications Rom. Extremely easy tc use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. All input may be copied into a buffer in memory over which full control is available. Controls of protocols are very simple and any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time-clock. **£29(d)**

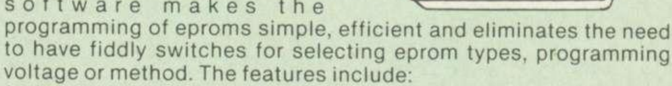
TERMI-II A good all round package for communicating with notice boards, electronic mail services etc. Termi is a semi-intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). **£28(d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£59(d).**

TECHNOMATIC

All prices exclude VAT

EPROMER II



A sophisticated eprom programmer that handles the full range of single rail eproms (incl 27256) and allows the user full control of the programming process.

Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered and complies with the Acorn protocols.
* Eproms upto 16K (27128) programmed in single pass.
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Full tape/disc filing facility. Data input from keyboard/Tape/Disc/Eprom.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.

EPROMER II with Manual & Cassette **£99(b)** Software on disc **£3** ROM based software **£10**

UV ERASERS

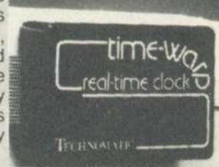
UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59(b).**
UV1T as above but without the timer. **£47(b).**
For Industrial Users, we offer UV140 and UV141 erasers with handling capacity of 14 eproms. UV141 has a built in timer. Both offer full built in safety features UV140 **£61;** UV141 **£79(b).**

SMARTMOUTH

The original 'Infinite Speech' Synthesiser — Still the best around!! A ready built, self contained speech synthesiser unit, attractively packaged with built in speaker. Tailored frequency response audio stages for optimum sound quality. Any word can be easily created — very economical with memory. Plugs into the user port — no roms required. Demo and development programs supplied on cassette (easily transferred to disc) **£31(c)**

'TIME-WARP' REAL-TIME CLOCK CALENDER

We have broken the price barrier! A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as Extensive software on cassette (easily transferred to disc) — no ROMs needed. **£29(c)**



RAMROM-15

The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. (Allows other units to be fitted inside the BBC). Absolutely no soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. All the hardware to take the RAM is already fitted e.g. battery backup. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£112(b)**

01-208 1177

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

ATPL SIDEWISE ROM EXPANSION BOARD

This is a well constructed expansion board, that does not require soldering in its installation. All buses are buffered. It allows full sideways Rom expansion to a total of 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K byte CMOS RAM chips, giving a total of 16K sideways RAM. This is ideal for sideways rom development, and will also allow downloading of software from cassette or disc. The battery backup option will allow retention of data in the RAM, when power to the computer is removed. Several link-selectable options include the choice of type of Eprom, and a 'write-protect' for the RAM option. **£39(d)** Back-up Kit **£18.**

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 separate IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. **£282(a)**

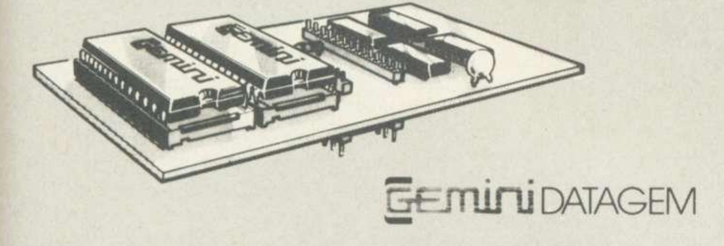
ACORN TELETEXT INTERFACE

This interface allows the retrieval and storage of data transmitted by both BBC and IBA. There are currently many educational and other programs being transmitted, and this unit will allow their retrieval absolutely free. In 'Terminal' mode, the system receives and decodes pages from both Ceefax and Oracle. (These pages can be stored). In 'Telesoftware' mode, the system can load, run and execute programs that are transmitted. This unit gives you a professional teletext terminal at a cost effective price. **£180(b)**

ACORN MUSIC 500

Convert your BBC micro into a sophisticated music composition aid and sound effects generator. Custom made software will provide you with the flexibility to compose, experiment, perform and teach music. Stereo output can be connected to a sound system including your home stereo unit. Full specification on request. **£174(a)**

DATABASE MANAGEMENT SYSTEM



Gemini DATAGEM

The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.

Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. **£112(c).**

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. **£75(d)**

ROMs/SOFTWARE

VIEW Acorn's new version V2.1 word processor rom. Advantages include printing straight from memory and editing in any mode. **£48(c)**

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. **£52(c)**

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. **£13(d)**

WORDWISE One of the most popular word processors for general use **£34(d).** Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price **£16.50(d).** If bought with Wordwise: No p&p and only **£14.**

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. New facilities include: 2nd Processor compatible allowing 80 column previewing in all cases, a new Basic-like language, new editing features and embedded commands etc etc. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. A new 56 page introductory manual and a 180 page reference manual complete this rather special package. Finally, it is able to use existing Wordwise files without any modification. **£49(d).**

SPELLCHECK II: A rom based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17000 words on 100K drive. Fully compatible with 6502 second processor. **£26(d)**

ISO-PASCAL: Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. **£60(c)**

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. **£60(b)**

ULTRACALC 2 This enhanced version of the original BBC Publications popular spreadsheet rom includes many new features including full compatability with the 6502 2nd processor running as HiCalc allowing 44K of user memory, operate in any mode, greater flexibility in printer control, spooling as ASCII file etc. All these features are in addition to the existing powerful features such as handling of labels and numbers as values. Column width control and features normality found in well designed spreadsheets. **£69(d)**

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. **£52(d)**

BCPL A full implementation of the BCPL compiler language consisting of the language rom, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. BCPL can be used to develop games programs, commercial packages, system software, to write control systems and to produce programs which otherwise would need to be written in assembler. **£52(b)**

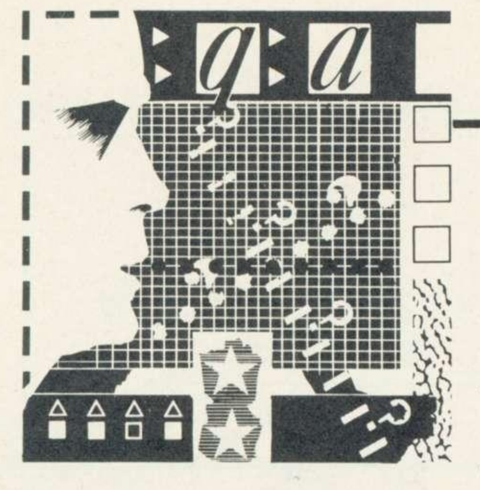
BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL rom to be converted so that they can be run on any BBC micro whether it has a BCPL rom or not. Stand alone programs for other 6502 based systems can also be developed. **£43(d)**

BCPL CALCULATIONS PACKAGE: supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. **£17.30(b)**

ACORN LISP Rom **£43(d)**

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM **£43(d)**

DISC DOCTOR Computer Concept's popular disc utility rom which adds 20 commands to the DFS system. **£27(d)**



The differences between Basic 1 and 2, disabling the Break key and a chart of teletext characters are among Martin Phillips' topics

Keeping hands off the Break key

£5

I GET many requests for methods of disabling the Break key in programs. At a superficial level it can be disabled (*KEY10 OLDIM RUNIM), but it's very difficult to protect all programs from the effect of pressing it.

Two sorts of protection have been requested. The first is for methods of disabling it against the deliberate Break key-pushers. This problem is very difficult to overcome because even if the Break key is protected they will find other methods to interrupt a program, eg, switch the machine off at the back. Even the most elaborate program cannot overcome this!

The second is for the inadvertent pressing of Break. This is often requested by school teachers who are frustrated when a program has to be loaded in again. This becomes less of a problem when the children become familiar with the machine, as they soon learn not to press the Break key.

For the latter problem there are three solutions – I shall list them in order of ease and usefulness.

The most obvious solution is not to press the Break key! Often beginners press it simply to clear the screen or stop a program, and it becomes a habit. It's not difficult to teach even very young children that this key should not be pressed. They will, of course, try it to see what happens, but they soon learn that it's not in their interests to press it.

To prevent the key being pressed inadvertently, Philip Baum (aged 12) has designed a simple but effective Break key guard, which earns him £5. It is made from a small piece of card which fits over the Break key of either the BBC micro or the Electron. Figure 1 is a template and should be drawn up to the dimensions shown and cut from card along the solid lines. Score along the dotted lines, then Sellotape it to form a box shape. The same idea can be used to protect other keys too.

The third method of protection is more drastic, involves a certain amount of soldering experience, and is only possible on the Beeb. When the BBC micro was being designed, the specifications were for a Break key at the back of the machine. It was eventually decided to put it on the keyboard, but provision was made for it to be moved to the back of the computer if so required. On older machines, there is a reset hole at the back of the machine, just to the left of the analogue port (looking from the front). This is missing on newer machines but there is provision for the switch on the circuit board. A push-button must be wired to this switch position on the main circuit board. This then should act in just the same way as the Break key does, and can be used with the CTRL key for auto-booting discs.

Next it's necessary to disable the Break key itself. This can be done on older machines by cutting the link on the keyboard circuit board shown in figure 2. On newer machines, with the new keyboard, it's not possible to get at the links because of the metal keyboard plate which covers the circuit board – the only way is to cut the track from the Break key that leads to the connector.

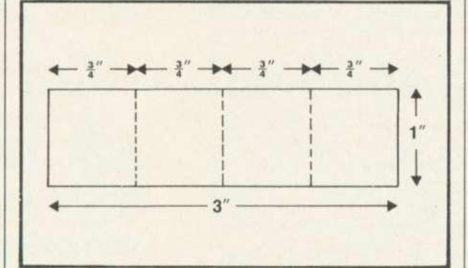


Figure 1. Template for Break key guard

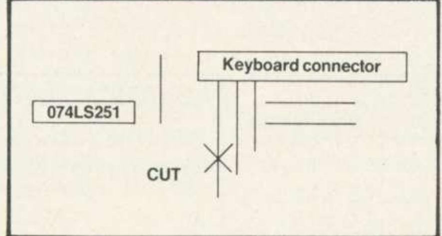


Figure 2. Where to cut the link on the keyboard circuit board

IF YOU have a technical hitch or a programming problem let Martin Phillips give his diagnosis. We'll pay £5 if you raise a really interesting point. Please give full details of the system you're using and include a listing where appropriate, making your question as specific as possible. WRITE TO: Hints & Tips, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Let the experts find your faults

I OFTEN receive letters from readers describing a fault on their computer and asking for advice on how to repair it. To give an answer here is very difficult without having the machine to test, as there are often many possible causes.

In many cases the simple answer is to return it to your local computer shop and let them deal with it. In my experience, most faults cost very little to rectify. Reputable computer shops can usually carry out the repairs quickly, and they have the equipment to test the micro. This can end up much cheaper than attempting a repair yourself and risking further damage.

You can help the dealer by providing a written description of the fault, or the circumstances under which it occurs – eg, that random characters appear on the screen after the computer has been on for several hours. That way the service engineer knows he should leave the computer switched on for some time before looking for the fault (the sooner he finds the problem the cheaper the repair bill). Intermittent faults have a habit of only occurring at home, and the computer behaves perfectly when in the computer shop – obviously these are very difficult to trace.



UNBEATABLE VALUE

5¼" DISC	1-4 Boxes	5-9 Boxes	10+ Boxes
SINGLE SIDED			
Description	Ex. VAT	Ex. VAT	Ex. VAT
Double Density 40 Track 48 TPI	**11.90**	**10.90**	**9.90**
Double Density 80 Track 96 TPI	**17.90**	**16.90**	**15.90**
DOUBLE SIDED			
Description	Ex. VAT	Ex. VAT	Ex. VAT
Double Density 40 Track 48 TPI	**16.90**	**15.90**	**13.90**
Double Density 80 Track 96 TPI	**19.90**	**18.90**	**17.90**
PLASTIC LIBRARY CASES **£1.50** Ex. VAT			
Packing & Delivery 75p per box or Free for 10 + boxes			

Education Authorities, Dealers & OEM's can obtain quantity discounts on 8", 5¼" & 3½". Please phone for prices.

AIM is a well established company in the United States and Great Britain and our reputation is such that we supply only prime quality, American manufactured Diskettes with Lifetime, no quibble, guarantees.

We **AIM** to dramatically reduce your operating costs, so why not call us for all your requirements.

AIM Diskettes are shrink wrapped, packaged in boxes of ten and come complete with hub ring, sleeve, write protect and coloured library labels.

Please send the following quantity of AIM DISKETTES		
Description	Qty	Price (ex VAT)
10 SS/DD 40 T 48 TPI		
10 SS/DD 80 T 96 TPI		
10 DS/DD 40 T 48 TPI		
10 DS/DD 80 T 96 TPI		
Plastic Library cases £1.50		
Total value exclusive of VAT		
Total packaging & delivery		
Sub-Total exclusive of VAT		
VAT at 15%		
TOTAL VALUE (payable to AIM)		

ADVANCED INTERNATIONAL MARKETING (UK) LTD
74a Heath Road, Twickenham, TW1 4BW
Telephone: 01-891 3644. Telex: 946461
(USA) 111 West St John Street, San Jose, Cal 95113

Name ....

Address ....

....

.... Post code ....

Please debit my Access card, No. ....

Signature:

AU1

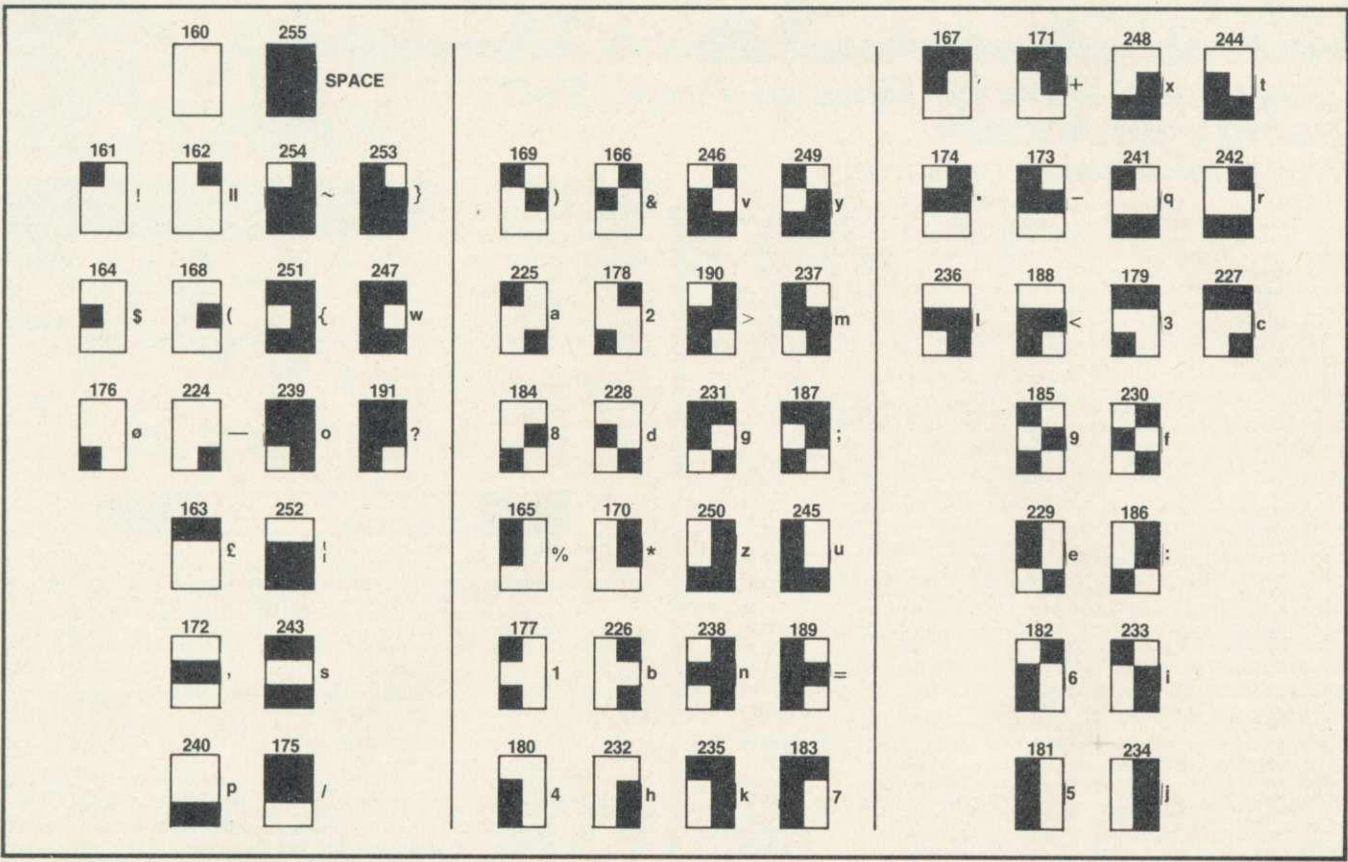


Figure 3. Graphical order layout for the teletext characters

£5

Teletext characters on show

A USEFUL chart of the BBC's teletext characters wins £5 for D Webb of London. He was prompted to devise the chart after trying to use the one in the BBC User Guide, which is set out in numeric and not graphical order, and uses black for the background and white for the coloured characters. He also found that character 228 was upside down (yet another User Guide bug?).

Mr Webb laid out his teletext character sheet with the following logic:

1) Sort characters into groups of '0' cells, '1' cells, '2' cells, etc.
2) Pair each shape with its partner if it has one, ie, left-hand and right-hand.
3) Pair these shapes with their inverse partner, eg, black cell for white cell.
4) Arrange with top left-hand cell starting in the top left-hand corner.
5) Number so that black cell represents actual screen pixel shaded.

If all this seems rather complicated, then look at the chart (figure 3). It really is far easier to find which number refers to a particular character.

The teletext characters can easily be entered from the keyboard. First press CTRL together with a function key.

f1 gives red graphics
f2 gives green graphics
f3 gives yellow graphics
f4 gives blue graphics
f5 gives magenta graphics
f6 gives cyan graphics
f7 gives white graphics

Pressing any of the keys shown on the chart will give the appropriate teletext character. These can be included in programs by enclosing them and the function key code inside speech marks after a PRINT statement. They can also be put after a REM statement provided it, too, is enclosed by speech marks. Do be careful if using this technique in listings you intend to print out, for these teletext codes do funny things to the printer and have to be filtered out using the *FX6 call. Even so, the printer will not be able to display these codes.

Listing 2 allows you to view all these codes. It is a short routine which will display each of the codes in turn plus the ASCII number. The codes are displayed in green, but can be changed by altering the CHR$(146) in line 30:

CHR$(145) gives red graphics
CHR$(146) gives green graphics
CHR$(147) gives yellow graphics
CHR$(148) gives blue graphics
CHR$(149) gives magenta graphics
CHR$(150) gives cyan graphics
CHR$(151) gives white graphics

Note that ASCII codes 192 to 223 do not produce graphics characters. If required, these can be filtered out of the above listing by inserting another line, eg:

```
25 IF N>191 AND N<224 THEN
GOTO 50
```

No filing system, no application

IN FEBRUARY's Hints and Tips, I published a procedure for determining the current filing system, and asked how it was possible to select no filing system.

C J Davies from Hove in Sussex has written a short routine (listing 3) to produce a dummy filing system that will then give a 'no filing system' error if any filing system command is given.

The program works by calling OSFSC with A=6 to warn the current vector owner that it is no longer in control, then setting up the vectors to the dummy filing system, and lastly issuing ROM service call &0F to warn other ROMs of the vector change.

Please don't write in to ask for applications for this program! The only possible one I can think of is as some form of protection against copying, but even this is doubtful.

SOFTWARE, FIRMWARE AND HARDWARE FOR YOUR BBC MICRO

Buy direct through Prestel (Page *2582020) using your Access

Most programs available on Micronet

105	MAILING	Holds 218 addresses. Alpha & Post code sorts, searches, any label format, delete, add and amend	£11.95	B
201	GAMES 1	5 Card, Minefield, Darts, Pontoon & Mrmidon	£5.95	B/E
202	STOCKMARKET	Exciting world of Stocks and shares. 1-4 players	£5.95	B/E
301	HANGMAN	Word game in English, French, German, Italian, Spanish	£7.95	B
302	DISTANCES	Three graphic maps of U.K., EUROPE & the WORLD. Calculate the distance between any 2 places	£4.95	B/E
303	FLAGS	98 full colour flags of the world with questions	£4.95	B/E
304	STATPACK	Statistics package giving over 30 results	£11.95	B
305	GRAPH	Produce varied graphs & charts of functions	£7.95	B
306	FRENCH	A New audio visual computer way to learn a language	£7.95	B
307	SPELL-CHECK	Add to WORDWISE. 15000 words in 12 dictionaries ideal in education	£17.95	B
504	PROCAID	includes SEARCHBAS to search a BASIC program and alter it. PROCVAR to list variables in a BASIC program & PROCFLUSH to clear resident integers in RAM	£3.45	A/B
505	UTILITY-A	Our best selling tape includes PROCAID, DEFCHER to design & display graphic characters, SORTM/C a very fast machine code numeric sort, SORTBAS the undisputed fastest BASIC sort routine	£5.95	A/B
520	BANNER	Print giant text and graphics on paper for displays	£3.95	A/B
521	BIGLETR	Print as above on screen/paper with screen dump	£5.95	A/B
600	FORTH	'79 FORTH second language ROM	£34.74	B
601	LOGO-FORTH	Advanced Turtle Graphics Language ROM with FORTH	£57.50	B
602	PASCAL-T	Structured language ROM with compiler- interpreter	£57.50	B
603	XCAL	Computer Assisted Learning ROM for presentations	£65.00	B
605	WORDWISE	Super fast & easy to use wordprocessor in ROM	£33.95	B
606	CDUMP	Screen dump, 8 colours, suitable for GP700A	£12.95	B
607	GDUMP	Screen dump ROM, 8 shades, 8 sizes and windows	£17.95	B
608	GRAPHICS	NEW ROM for Sprites, LOGO, circles, etc	£27.50	B
700	BOOKS	Various titles for the BBC Micro from	£6.95	
801	CASSETTES	C15 Computer quality tapes packed in 10's	£4.50	
810	5.25" DISCS	MEMOREX SS/SD 40/80T £19.95 SS/DD 40/80T	£20.95	
901	EPSON RX-80 T/F	Superb. 100cps with Tractor & Friction feed	£275.00	
902	EPSON FX 80	Magnificent 160cps, 6 founts, graphics, F/T Roll	£365.00	
910	DISC DRIVES	Slimline 3" or 5¼" 100K-800K Japanese Format disc	£369.00	
		cable and excellent manual. Plus £50 of FREE Software	£189.00	
915	DISC UPGRADE	Double or Single Density available in one system	£89.00	
920	VDU STAND	Stainless Support protects your micro	£19.95	
930	GREEN VDU	12" Green Monitor, cream sloping front case	£79.95	
931	COLOUR VDU	JVC 14" Colour Monitor 370 x 470 pixels	£179.95	

ADD VAT TO ALL PRICES EXCEPT BOOKS

Add £1.75 for programs on 40 or 80 Track Disc. No post charge in UK

Send for our free brochure for more information before parting with your money.

memo-calc

107 MEMO-CALC £12.95 B C/D

"IT MUST BE AMONG THE LEAST EXPENSIVE PIECES OF USEFUL SOFTWARE YOU WILL EVER BUY" Revue by Practical Computing July 1983.

Database/calcsheet program which allows up to 255 columns. The number of rows is automatically set from 5 to over 1000 depending on the columns declared. Both numeric and alphanumeric data can be stored in any cell and can be of any length up to 255 characters.

There are a multitude of uses for this program from accounts to diaries, club or personnel records etc. and is probably the one program that we all need. MODE7

107a Manual for MEMO-CALC included free otherwise £2.00 (0% VAT)



Part 1 is a BASIC program running in MODE7 which accepts new data on employees, allows additions, deletions and alterations, listing of P35 & automatic alterations to the codes as required by tax notice P7X. Fully 'user friendly' with colour and graphics to make life simple for the operator.

Part 2 (WEEKLY) or Part 3 (MONTHLY) is designed to handle the calculations of wages and N.I. It allows for standard pay, two overtime rates, optional pension funds (monthly only) other pay, holiday pay, bonuses, post-tax adjustments and no pay.

106b COIN ANALYSIS £4.95 B C/D

106c PENSION £4.95 B C/D EXTRA

106d PAYSLIP FORMS £25.00 per 1000 EXTRA

Buy direct or Prestel No. 25821534.

£27.95 + VAT

Most Programs Now Available For MSX Basic

Dealer Enquiries Welcome

ORGANISATION AT YOUR FINGERTIPS!

We are pleased to offer you a wide range of products primarily for the BBC microcomputer software, firmware and hardware for your computer system.



PERSONALISED SOFTWARE

"We are happy to quote for writing programs to suit your own specific purpose. Please telephone for details in first instance."

CASHBOOK

102 CASHBOOK £11.95 B C/D

FIRST CHOICE This is a double entry cashbook program showing cash and bank credits and debits. i.e. 4 columns. Any number of individual accounts can be used and analysed or totalled individually or cumulatively by associated group. A friendly but very practical, and reliable program which despite its low cost is used by many people in a range of situations from domestic and clubs to schools and businesses. MODE7

102d CASHBOOKd £19.95 B D

SECOND CHOICE This version of the above program uses random access disc files and can hold up to 1250 entries on 100K discs and up to 2500 on 200k discs. There is sophisticated protection against unauthorised use built in. MODE 7

102f ACCOUNT £29.95 B D

THIRD CHOICE This version of the above program uses random access disc files and an hold up to 1100 entries on 100K discs, and up to 2250 on 200K discs. Included is a choice of CASH/BANK or VAT/BANK headings. Over 830000 possible accounts combinations. Ledger sheets and summaries can be printed as well as full accounts. The latest balance is available at any time. This program is only available on disc MODE 7

Special Interest Items

NEW EXTENDED PAYROLL

Disc only version of our very popular PAYROLL with extensions to include three O/T rates, SSP, contracted in and out, pensions, personnel records and many other features – £49.95 + VAT.

ACCOUNT and CASHBOOK d PROGRAM OWNERS Please note we can now offer monthly analysis feature. Return your disc with £10.00 for upgrade.

Top Mailing Program

RANDOM MAILING up to 1850 addresses, names, phone numbers & codes one disc. Selective printing any number of labels, repeat, stationery or fan fold. Automatic WORDWISE & letters produced repeatedly with personalised names many other features such as automatic sorting by company or personal names. By far the best and most comprehensive program of its type for the BBC Micro Price £29.95 + VAT

Micro-Aid

25 Fore St. Praze, Camborne Cornwall. TR14 OJX tel: 0209 831274

What's the difference between Basic 1 and Basic 2?

THERE are two versions of the Basic language available for the BBC micro – Basic 1 and Basic 2. It's easy to tell them apart – as soon as the computer is switched on type REPORT and press Return. A copyright notice will be printed out; if the year is 1981, then it is Basic 1, and if it's 1982 then the version is Basic 2. The Electron is only supplied with the Basic 2.

Although there are many BBC micros with Basic 1, a lot of people are writing programs on a machine with Basic 2 and not checking that they work on Basic 1. The unfortunate person with Basic 1 finds that the program will not work because the author has used some feature of Basic 2 that either is not present in Basic 1 or does not work correctly.

My 'Black Book' of publishers who have committed this error is rapidly growing, and includes some surprising names – publishers one would have expected to test their programs under all conditions. Even the national MEP has committed this error in recent software it has distributed.

My own machine has both Basic 1 and Basic 2, and I can easily switch between the two using the *FX142 call. The parameter following the *FX142 is the ROM socket number of the version of Basic to be selected. I have placed them in the ROM sockets so that Basic 1 is selected by default. That way all my programs are tested on Basic 1, and I am able to give special Basic 2 versions where appropriate.

Many readers with Basic 1 will be wondering if it's worth buying the new version. Unlike the newer operating system, which was sold quite cheaply, it's expensive to purchase Basic 2 – mine cost about £40. There are only a couple of bugs to be cured, and several new commands have been introduced. Because of the number of computers which were supplied with Basic 1, I feel it's unlikely we'll reach the point where owners are expected to have upgraded their machines to the new Basic, in the same way as was expected with the old 0.1 operating system.

What are the differences to be found in Basic 2? INSTR works even if the second string is longer than the first; ON . . . GOTO and ON . . . GOSUB can be followed by ELSE without a byte being left on the stack; several improvements were made to the error messages; the SIN, COS and LN functions were completely recoded to make them more accurate; the binary to decimal string conversion routines used for PRINT and STR$ were changed to allow up to 10 figures of precision on printing.

A new statement, OSCLI, was introduced, and four new operations were made available in the assembler – EQUB, EQUW, EQUD and EQUS. A new statement (OPENUP) was introduced which had the same token as OPENIN, and OPENIN was given a new token value.

None of these changes is very significant but some can create problems if the program is then to be run using Basic 1. Obviously, EQUB, EQUW, EQUD and EQUS should be avoided completely, as should OSCLI. The ON . . . GOTO . . . ELSE or ON . . . GOSUB . . . ELSE bug is best avoided by not using that syntax.

The INSTR bug, however, can be annoying. It causes unpredictable results when the second string is longer than the first. This can be avoided by always using INSTR in a function:

```
DEF FNinstr (a$,b$)
IF LEN(b$) > LEN(a$) THEN = 0
= INSTR(a$,b$)
```

This will work with Basic 1 or Basic 2. Similarly, the very useful OSCLI which is not available on Basic 1 can be implemented by using a short procedure:

```
DEF PROCoscli (a$)
DIM A 20
$A = a$
X% = A MOD 256
Y% = A DIV 256
CALL &FFF7
ENDPROC
```

This procedure will also work with Basic 1 and Basic 2, although it's rather clumsy. It's not good programming to put the DIM statement in the procedure – it's best put at the start of the program. The DIM space, in this case 20, can be varied to suit the expected length of the OSCLI string.

A different way of doing this, avoiding the use of the DIM statement, is to specify the memory start location for the string. The following example uses locations &900 on. Note that it's not possible to use zero page locations here.

```
DEF PROCoscli (a$)
A = &900:$A = a$:X% = 0:Y% = 9
CALL &FFF7:ENDPROC
```

The other main problem Basic 1 users will find when typing in listings is that they get an error message at a line containing OPENUP. This should be changed to OPENIN for the program to work correctly.

Quickfire questions

PROBLEMS trying to insert fan-fold paper into a printer? Then don't insert the end of the paper, fold it at the first perforation and then insert it into the printer. The fold makes a strong, clean edge with less risk of tears and jamming, and once threaded, the surplus paper can be rewound.

TAKE THE cover off the BBC now and then (unplug it first) and you will be amazed at the dirt that collects under the keyboard. Clean between the keys with a clean *new* paintbrush. Unfortunately this is not so easy to do with the Electron, as the keyboard is fastened to the top part of the case, so I'd advise Electron owners not to open up the machine unless it's absolutely necessary.

IF A function key needs to be recalled, type AUTO and press Return, then press the function key and its contents will appear as a program line (or as a series of program lines). If in the middle of a program then start the AUTO line number off at a high line number and delete when finished with.

Disc full message bug

MY PLEA for help with a 'Disc full' message in February's issue had only two replies – from C Sherin and B Beeston – indicating that this is a very obscure fault. There would appear to be two problems: one in the Watford DFS, and the other in the disc drive itself. Mr Sherin managed to cure a similar fault by having his disc drive realigned.

Why the 'Disc full' message? This is a minor bug in the DFS, I believe. I have got this error message when doing a *BACKUP using a twin switchable drive. It appears if one tries to backup from one format to another, eg, 40 track to 80 track (which is not possible). It seems that perhaps this error message is called at an inappropriate time.

You'll find Hints and Tips listings 1 and 2 on yellow page 97

The XLtron MEGA•BOX



Measures 6¼″×8¾″×6½″

The original and still the leader in value.

XLtron Floppy Disk Prices

All disks are 5¼″, 48tpi, featuring write protect notch, centre hubs, double and single density, Tyvex sleeves and full set of labels.

25 SS/DD disks in **MEGA•BOX** £29 plus VAT £4.35 and £2 p&p = **£35.35**

25 DS/DD disks in **MEGA•BOX** £39 plus VAT £5.85 and £2 p&p = **£46.85**

50 SS/DD disks in **MEGA•BOX** £50 plus VAT £7.50 and £2 p&p = **£59.50**

50** DS/DD disks in **MEGA•BOX** £70 plus VAT £10.50 and £2 p&p = **£82.50

10 SS/DD disks in **mini•box** £13 plus VAT £1.95 and £2 p&p = **£16.95**

10 DS/DD disks in **mini•box** £18 plus VAT £2.70 and £2 p&p = **£22.70**

***£5 PRICE REDUCTION**

The MEGA BOX is a top quality rigid plastic storage box with see-through lid and four dividers. Holds up to 60 diskettes.

THE midi•box

15 DS/DD disks in our **midi•box** at a bargain price. Our new **midi•box** has some great features. It's made of high impact plastic and holds up to 30 5¼″ disks, but is one of the neatest on the market. Measuring only 6″×6″×3″, the rigid lid conveniently holds the disks you are working on ready to hand. And with 15 DS/DD disks its a bargain at only £20 plus £3 VAT and £2 p&p = £25.





SUPERDISK

Suitable for any user, any computer, any format. Single sided, double sided, 48 or 96 tpi. Individually tested.



10 in a **mini•box** £19 plus VAT £2.85 and £2 p&p = **£23.85**

15 in a **midi•box** £25 plus VAT £3.75 and £2 p&p = **£30.75**

25 in a **MEGA•BOX** £42 plus VAT £6.30 and £2 p&p = **£50.30**

50 in a **MEGA•BOX** £80 plus VAT £12 and £2 p&p = **£94.00**

Disco·Tech (U.K.) Ltd., Lex House, 3–6 Alfred Place, London WC1, England.

Disco·Tech (U.K.) LTD. are the sole distributors of XLTRON.



Atari owners ring for 'flippies' prices

Suitable For Most Popular Micros

XLTRON disks are recommended for BBC, Atari and Commodore computers. If you need advice on other micros just ring 01.631 0255

Our Quality Promise

You can order with confidence. We buy disks from international manufacturers to our specifications, then test, retest and grade them in our London laboratories.

Fully Guaranteed

The XLTRON quality control is so stringent that we can give our famous 'two for one' guarantee. If you find a faulty disk, return it to us, and we'll send you two in exchange immediately. All part of our five year guarantee.

© TYVEX is a registered name of Du Pont.
© RHINOKOTE is a registered name of Disco Technology Ltd.
© XLTRON is a registered name of Disco Technology Limited.

Personal Callers Very Welcome

We're now established in our new showroom in Alfred Place. You can save our £2 delivery charge by calling in – you'll be welcome weekdays from 10.00am till 5.00pm Saturday 10.00am-4.00pm.

Help Lines

Technical: 01-631 0255
Sales: 01-631 3600

If you want help or information to place an order just ring our 'help' lines.

Official Orders

We accept orders from all government bodies, schools, universities, libraries, armed forces etc. We despatch on receipt of an official purchase order. If you can't raise a cheque without an invoice, just post or telephone your order and we'll send you a pro-forma by return.

To: Disco·Tech (U.K.) Ltd., Lex House, 3-6 Alfred Place, London WC1, England

Just fill in the coupon or send your order on a postcard or letter. Or phone your order on 01.631 3600 AU

Please send me the following, (tick the appropriate boxes):

_______ (QTY) □ SS/DD □ DS/DD □ SUPERDISK disks in a

□ **MEGA•BOX** □ **midi•box** □ **mini•box**

I enclose a cheque/p.o. for £_______ or debit my Access/Diners/Amex card

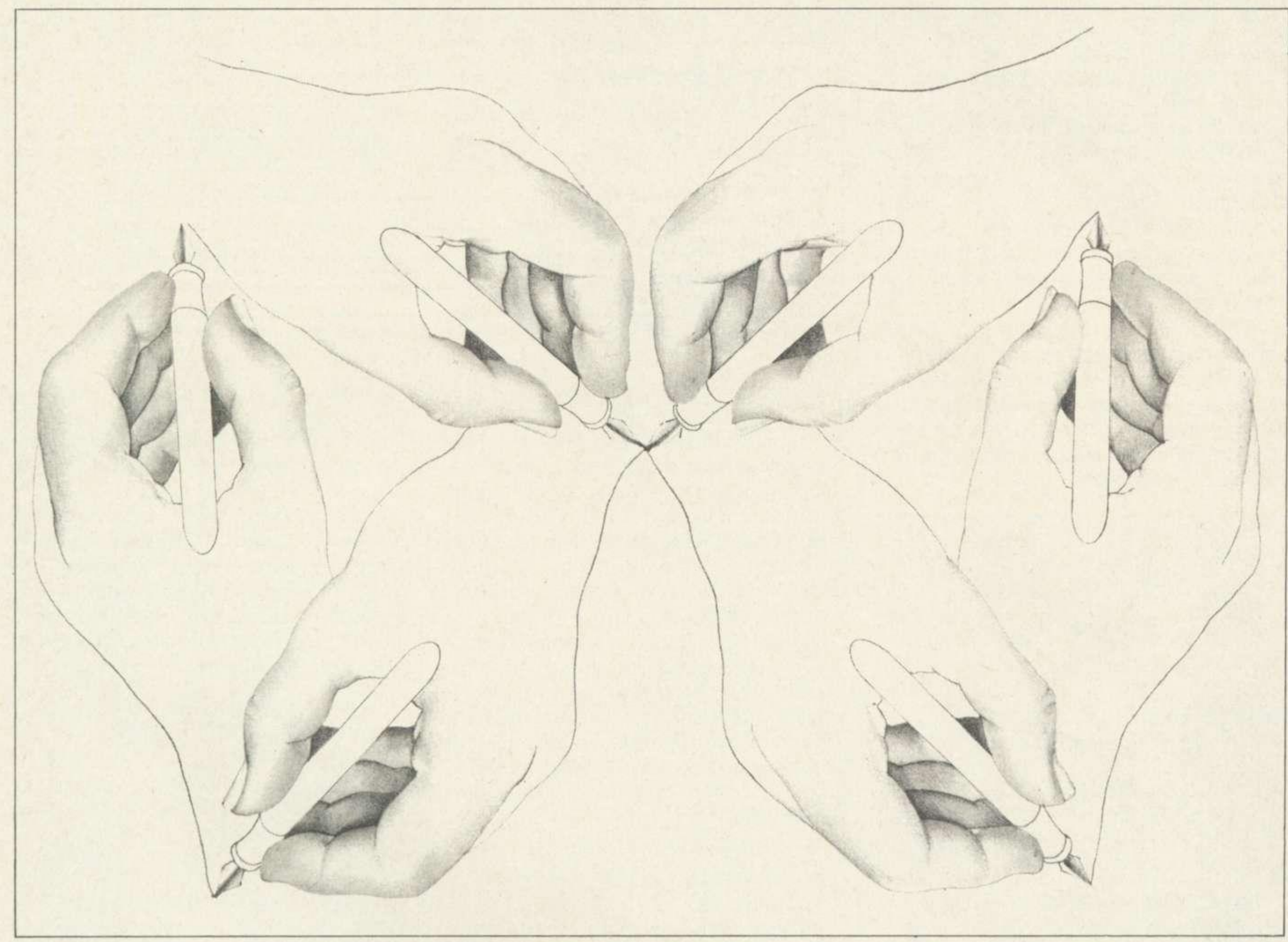
card no. _______

Name: _______ Signature: _______

Address: _______

_______ Postcode: _______

(Block Capitals Please)



LOOP THE LOOP

Tessie Revivis discusses one of the key issues for understanding and writing successful programs

ONE AREA where computers excel is their ability to perform repetitive tasks simply and quickly. For example, when your micro is switched on and you think it's just sitting there waiting for you to type a command in, it's actually executing an incredibly fast program that is repeating an endless stream of loops. Consider just what the program does; it looks at the keyboard, it displays characters on the screen, it flashes the cursor and so on – you can almost imagine that there are a thousand leprechauns running around inside with buckets of information.

Program loops are an extremely important facet of learning to program correctly, and there are two different types available on the Electron and BBC micro. First there is the FOR ... NEXT loop – this is used when we know the number of times we wish that particular loop to be repeated. The second type is the REPEAT ... UNTIL loop – this is used to repeat a loop until a certain condition is met. FOR ... NEXT loops are probably the most common so I'll examine these first.

Suppose we wanted to print a list of numbers from 1 to 1,000,000. The hard way would be to write a program with a million lines, each printing a single number – obviously ludicrous and time-consuming. Utilising a FOR ... NEXT loop, the whole program takes just three short lines:

```
10 FOR N% = 1 TO 1000000
20 PRINT N%
30 NEXT N%
```

Value of @% to Format 2 with 5 decimal places to a field width of 8 places

The FOR and NEXT commands are called the entry and exit positions, and as you can see, they are at opposite ends of the program. Because we want to perform the loop one million times we need to keep a record of the current count values. To do this we can use a variable, N% in this instance. You can use any variable you like but it's good to get into the habit of using the same variable to perform the same function wherever possible. This helps to ensure that your program is error-free, and makes the program easier for you to write and follow. I always use N% and L% to act as number and loop counts respectively. Avoid using the letters I and O as variables such as I% or O% because they can be confused with ones and noughts.

The counting program begins by

page 46 ▶

defining the range of N%, which starts at 1 and goes on to 1000000. Line 20 prints the current value of N%, and finally line 30 says do the NEXT value of N% – this effectively increments the value of N% by 1. When N% reaches its maximum prescribed value the loop is completed. The program in this instance would finish but if it formed part of a bigger program it would continue with the next line.

This loop has limitations in that it only goes up or increments in steps of one. How would we go about printing the even numbers between 0 and 100? One answer would be to add an extra one to the loop variable within the FOR ... NEXT loop itself:

```
10 FOR N% = 0 TO 100
20 PRINT N%
30 N% = N% + 1
40 NEXT N%
```

Line 30 adds one to the current value of N%. Remember that the loop itself adds one to N%, giving us the step size of two. This method is clumsy, though, and an extra statement can be added to the FOR ... NEXT combination to specify the exact step size. This keyword is STEP and is inserted at the end of the FOR line. Our even numbers program would become:

```
10 FOR N% = 0 TO 100 STEP 2
20 PRINT N%
30 NEXT N%
```

Much neater, you'll agree. See if you can modify this program to print the numbers from 25 to 75 in steps of five. We can also get FOR ... NEXT loops to work in reverse (to count backwards if you like), by reversing the order of the loop control variable parameters and specifying a negative step size. The following program counts from 100 down to 1:

```
10 FOR N% = 100 TO 1 STEP -1
20 PRINT N%
30 NEXT N%
```

Here the entry value is 100, the exit value is 1 and the step size is –1. What would happen if we left out the STEP size in this program?

The second type of loop is REPEAT ... UNTIL. This does not require a variable to work on but has to test for a certain condition being met. The loop will repeat continuously until that condition is met.

We could translate our one to one million counting program as follows:

```
10 N% = 0
20 REPEAT
30 N% = N% + 1
40 PRINT N%
50 UNTIL N% = 1000000
```

The immediate thing to note here is that the program is longer, twice as long in fact, so it's not very efficient when used as a counting loop. The reason is that the program itself must take into account, and remember to increment, the loop control variable. First line 10 sets N% equal to nought. Then it enters the loop, increments N% by one prior to printing its value. Finally it tests to see if N% is equal to one million.

REPEAT ... UNTIL loops are much more useful in testing for non-counting conditions. Suppose we wanted to detect and display a key pressed at the keyboard and continue doing so until the Q key was pressed. Using a REPEAT ... UNTIL loop makes this task simplicity itself:

```
10 REPEAT
20 C$ = GET$
30 PRINT C$
40 UNTIL C$ = "Q"
```

Run the program, and press any of the alphanumeric keys. They are displayed until you press the Q key. The UNTIL condition in the loop at line 40 has now been fulfilled so the loop is exited. The condition you test for in the UNTIL statement can be almost anything that can be evaluated by the program. You can even make a program repeat forever (well, until Escape or Break are pressed) by changing line 40 to read:

```
40 UNTIL FALSE
```

Loops may also enclose loops. In other words it's quite permissible to place a loop inside a loop, a technique known as 'loop nesting'. Two REPEAT ... UNTIL loops can provide the basis for a number guessing game:

```
 10 REM Number Guessing
 20 REPEAT
 30 R% = RND (9) + 49
 40 REPEAT
 50 PRINT "Guess a number ";
 60 G% = GET
 70 IF G% < > R% PRINT "Wrong!"
 80 UNTIL G% = R%
 90 PRINT "Correct, well done!"
100 REM Press a key to continue
110 K% = GET
120 UNTIL FALSE
```

You should be able to see the two loops. The outer loop is the overall control loop, in this case it just ensures that the program repeats when finished(!). The inner loop is responsible for playing the game and continues asking you to guess until you get it right.

FOR ... NEXT loops may also be embedded with REPEAT ... UNTIL loops and vice versa. Similarly FOR ... NEXT loops may be nested inside each other, but care must be exercised here. Look at the following program – what's wrong with it?

```
10 REM Nested loops
20 FOR N% = 0 TO 100
30 PRINT N%
40 FOR L% = 1 TO 99
50 PRINT "L% = ":L%
60 NEXT N%
70 NEXT L%
```

Have you spotted the mistake? The NEXT variables are the wrong way round. If you run this program you will get an error message. FOR ... NEXT loops nested within one another must be symmetrical: a FOR must always have a matching NEXT, as figure 1 shows.

```
10 FOR A%=1 TO 100
20  FOR B%=1 TO 100
30   FOR C%=1 TO 100
40    FOR D%=1 TO 100
50    NEXT D%
60   NEXT C%
70  NEXT B%
80 NEXT A%
```

Figure 1. If FOR ... NEXT loops are nested inside each other, they must be symmetrical

Another downfall is trying to jump out of loops before they have fulfilled their potential, as this awful example shows:

```
10 FOR N% = 1 TO 100
20 IF N% = 50 THEN GO TO 50
30 NEXT N%
40 END
50 PRINT "N% = 50"
```

Here the loop will never be completed and this will leave the computer in a very confused state of mind. If your program was of any length this would almost certainly cause it to crash at some stage. If you must jump out of a loop do so by fulfilling the exit condition. The above program could be rewritten to ensure a smooth run thus:

```
10 FOR N% = 1 TO 100
20 IF N% = 50 THEN N% = 100
30 NEXT N%
40 PRINT "N% = 50"
```

Here, although the FOR ... NEXT loop only goes from 1 to 50 the computer is fooled into thinking it has completed it 100 times and remains happy.



Watford Electronics




Dept. AU, 250 High Street, WATFORD, ENGLAND
Tel: Watford (0923) 40588/37774 Telex: 8956095 WAELEC
ACCESS ORDERS Tel: (0923) 50234

BBC Micro 'B' Only: £299

Price includes FREE 5 games software packages

BBC MICRO 32K + 32K

(extra 32K RAM Card already fitted)

Only: **£359**

BBC B with Watford DFS	£342
BBC B with Acorn DFS	£352
BBC B with Watford DDFS	£375
BBC B with ECONET	£335
BBC B + DFS + ECONET	£395
BBC B + DFS + 32K RAM Card	£407
BBC B + 13 ROM Board fitted	£325
BBC B + 32K RAM + 13 ROM Board	£386
BBC B + DFS + 32K RAM + 13 ROM Board all fitted	£439

Complete BBC B ECONET Networking System now available.

(P.S. ROM based software purchased with any of the above Micros will be fitted free of charge).

6502 Acorn 2nd Processor	£175
Z80 Acorn 2nd Processor	£339

TORCH Z80 Card + Software	£275
TORCH Z80 Card+Soft. + Disc Pack	£649
TORCH UNICORN Z80 System	£650

Acorn Bitstick	£325
Acorn IEEE Interface Complete	£280
Acorn Teletext + Interface	£195

(Securicor carriage on Micros £7)

Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies while not in use. **£3.50**

PRINTERS

- EPSON RX80 Printer **£209**
- EPSON RX80 F/T Printer **£219**
- EPSON FX80 Printer **£316**
- EPSON FX 100 Printer **£429**
- Centronics PRINTER CABLE for all the above printers to interface with the BBC Micro. **£7**

(Securicor carriage charge on printers £7)

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£25	RS232 + 2K Buffer	£55
IEEE 488	£62		

JX-80 FULL COLOUR PRINTER

The new Epson JX-80 DOT MATRIX COLOUR printer is fully compatible with the popular FX-80. Using a four colour ribbon, printing can be in 7 colours with speeds of up to 160 CPS. It is capable of 80 characters per line or 137 in condensed mode. Its resolution is selectable from 480 to 1920 dots per line. The printer has a friction and fully adjustable tractor feed mechanisms as standard.

Introductory offer **£525**

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
MX100/FX100	£10.00	£5.25
FX80/MX80	£4.75	£4.95
RX80	£4.75	£4.50
GP80	£4.50	–
GP100	£4.95	£3.95
GP250	£5.95	£3.95
KAGA KP810	£5.95	£4.75
CANON PW1080	£5.95	£4.75
MICROVITEC MONITORS	–	£5.50

4 COLOUR PLOTTER PRINTER

SAKATA SCP-800 printer/plotter facilitates plotting & printing in 4 colours on paper upto A4 size, using easily replaced pens. In text mode it prints upto 12 CPS. Max 160 Char. per line. In graphics mode it offers full plotting facilities incl. drawing, moving, scaling of text, rotation & drawing of axes. (Write for a sample printout).

Only £175

Set of 4 SPARE PENS only **£3.95**

PRINTER SHARER

Allows 3 BBC Micros to be connected to one Printer.

Only: £65

BROTHER HR-15 DAISY-WHEEL PRINTER

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional printing, proportional spacing, Centronics or RS232 interfaces as standard, optional sheet feeder and an optional keyboard.

With immediate effect, we are offering at no extra cost ON-SITE 12 months Maintenance on all HR15 Printers purchased from WATFORD on or after March 1985. W.E. GIVES YOU A GREAT DEAL

ONLY **£325** (carr. £7)

Single Sheet Feeder	£195
Electronic KEYBOARD	£135
TRACTOR FEED Attachment	£90

RIBBON CARTRIDGES: Fabric **£3.75;** Carbon **£3.75;** Multistrike **£6**

DAISYWHEELS (various typefaces) **£18**

Listing Paper (Perforated)

1,000 Sheets 9½" Fanfold Paper	£7
2,000 Sheets 9½" Fanfold Paper	£13
1,000 Sheets 15" Fanfold Paper	£9
Teleprinter Roll (Econo paper)	£4

Carriage on 1,000 Sheets £1.50

PRINTER LABELS (On continuous fanfold backing sheet)

1,000	90×36mm	£5.00
1,000	90×49mm	£7.75
1,000	102×36mm	£6.25

Carriage on 1,000 Labels £1.00

All prices exclude VAT

SPECIAL OFFER

HITACHI EPROMs for Sideways ROMs

2764–250nS £3.99
27128–250nS £8.99

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6116LP (2K) £3.10
6264LP (8K) £9.25

(Maximum of 5 ROMs or RAMs of any one type per order). Dealers inquiry welcome.

KAGA KP810 NLQ PRINTER

This new Japanese printer has EPSON FX/RX compatible control codes and is functionally equivalent to an FX80 with the added advantage of its 'Near Letter Quality' mode. It is solidly built and features include: Normal, Italic, Enlarged, super/subscript, proportional spacing and user-defined character set. Extras over the FX80 included in the price are Near Letter Quality (NLQ) print ideal for correspondence, Proper adjustable tractor feed, half speed quiet mode and 3K buffer. The printer is bi-directional and logic seeking to give a speed of 140CPS for high throughput in conjunction with the standard 3K buffer. 8K RAM may be added to give more user-defined character sets. Centronics parallel interface + Watford's 12 month NO QUIBBLE WARRANTY.

Special Offer: ONLY **£252** (£7 carr.)

RS232 interface + 2K buffer to connect to other micros. **£89**

EPSON HI-80 PLOTTER

The latest addition to the popular range of EPSON Printers/Plotters. Prints in upto 10 colours. Has many more features. Please write in for spec sheet.

Price: Only **£399** (£7 carr.)

KAGA KP910 Printer

Similar to the KP810 but with 17" carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

ONLY **£339** (£7 carr.)

PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£7
Extra long (6 feet long)	£9

Continued


THE ULTIMATE DFSs for the BBC MICRO

Watford are proud to be able to supply both SINGLE and DOUBLE DENSITY versions of their highly acclaimed Acorn compatible DISC FILING SYSTEM.

THE FEATURES OF WATFORD'S SINGLE & DOUBLE DENSITY DFS.

- The system allows standard Acorn's 31 files or 62 files per disc side.
- Built-in formatting program.
- Built-in Disc VERIFIER.
- Built-in SECTOR EDITOR.
- Double step mode allows use of 40 or 80 track Discs on 80 track drives. (software switchable).
- A WORKFILE function allows a program to be edited and repeatedly saved having only typed its name once.
- Allows use of AMBIGUOUS filenames.
- Two commands exist to allow transfer of programs from tape to disc.
- An Advanced COPY COMMAND is included.
- RENAME has been extended to allow the use of ambiguous filenames.
- An improved OPENOUT command.
- A SPACE command informs you of the space left on the disc.
- 2K of RAM can be reclaimed from the DFS by setting "PAGE" to &1100.
- The *CAT command automatically utilises the full width of an 80 column screen where available.
- FULLY COMPATIBLE WITH TELETEXT, TORCH and both ACORN 2nd PROCESSORS.
- Disc prepared on ACORN DFS can be both read & written to on WATFORD's DFS & vice versa.

Please write-in for further detail technical specifications.

What do the independent press say?

"Good value for money" – Beebug
"A very worthwhile package" – The Micro User
"You'll be buying a very powerful package" – Personal Computer News
"Superior DFS; Excellent disc sector editor" – Computer Answers

Without a doubt the most sophisticated DFS software yet written for the BBC microcomputer. This powerful DFS is fully compatible with the ACORN DFS, yet has much increased power due to the additions, carefully designed to make life easier in normal use. It consists of 16K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

SINGLE DENSITY INTERFACE PRICES

- DFS (Disc Filing System) ROM **£18**
- Complete Disc Interface Kit Incl. DFS ROM & fitting instructions **£89**
- Acorn's DFS Kit complete **£86**
- DFS Manual (comprehensive) **£6.95**
(Our DFS Manual is suitable for both versions of Watford's DFSs and the Acorn DFS)
- We will exchange your existing Acorn DFS for Watford's ULTIMATE DFS for **£14**

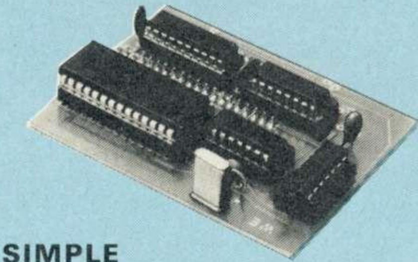
Please note that this is FULLY Acorn DFS compatible and runs, without exception, all products tested, including Elite".

Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail this product through dealers. Every ROM carries a printed label with our LOGO and a serial number.



ACCESS HOT LINE (0923 50234) 24 Hours

WATFORD'S ULTIMATE DOUBLE DENSITY DFS



SIMPLE but SOPHISTICATED

We are proud to bring to you the Watford Electronics Double Density Board for the BBC Micro.
The DDFS supplied is a new version of the popular Watford Electronics DFS re-written to make full use of the capabilities of the new double density controller.
We are proud to announce that our double density now runs all known versions of Acornsoft's best-selling game Elite. DDFS also runs Hi-View, Fortress, Aviator, Castle Quest, etc.

- Increases storage capacity of your Disc Drives by the maximum physically possible, **80% !!!**
- Our system will use the whole of an 80 track drive. Inferior systems do not allow files longer than &3FFFF bytes, but with our system files can be as long as one disc side.
- Discs may be created in either single or double density format with the built in formatter and in single density mode are fully compatible with normal Acorn format discs.
- The density of the disc you put in is automatically sensed by the system and you are informed of the density in the catalogue display.
- Copying of files between single and double density discs is automatically catered for.
- The double density system is of course faster than single density.

NOW Our 8271 emulator has been extended to cope with illegal sector IDs.

The Watford Electronics DDFS implements an extremely comprehensive 8271 emulator so that commands passed through OSWORD & 7F are correctly interpreted. Other manufacturers thought that read and write sector alone were sufficient – we decided to implement every command of the 8271 that was physically possible. We have allowed the use of all the special registers including bad tracks, allowed access to deleted data etc., etc. The emulator itself takes up around 1K of compactly written machine code. We reckon it will run many of the protected discs now available. Gain all the advantages of the WE DFS together with much increased storage and compatibility with many existing protected discs.
(please write-in for full technical specifications)

Complete Double Density Disc Interface **£85**
DDFS Manual **£6.95** (no VAT)
We will exchange your existing Single Density Interface for our DDFS Unit for **£45**
(Carriage £1.50)

3M - 5¼" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick, disc labels and write protect tabs.

DON'T SETTLE FOR LESS, BUY THE BEST

- 10 × S/S D/D 40 Track Diskettes **£13**
- 10 × D/S D/D 40 Track Diskettes **£18**
- 10 × S/S D/D 80 Track Diskettes **£22**
- 10 × D/S D/D 80 Track Diskettes **£24**

FREE with every pack of 10 × 3M Discs this most useful "Post-It" NOTE PAD & TRAY PACK.

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford Electronic's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

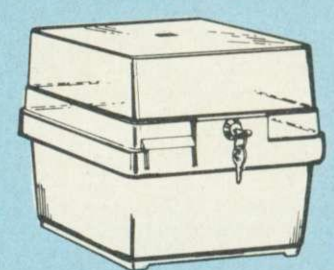
There is even a handy section describing the phrases you are likely to encounter, and how to interpret them. This book must be an essential purchase at £5.95, especially if you own or are thinking of buying a disc system.
£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

£4.25

LOCKABLE DISK STORAGE UNITS



Strong plastic cases that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

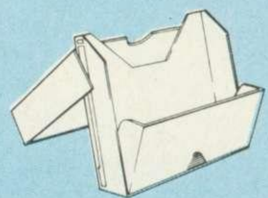
M35 holds upto 40 discs **£12**

M85 holds upto 95 discs **£15**

FLOPPY HEAD CLEANER KIT

The heads in a floppy disc drive are precision made and very sensitive to dirt. Drive manufacturers recommend that you clean the heads approximately once a week. Unless your home or office is dust free one of these kits is a very sensible precaution against losing valuable data. A dirty head can destroy many disks before you realise the trouble. Very simple to use.
Only **£9**

PLASTIC LIBRARY CASES



for Disc Storage 5¼" (holds 10) **£1.80**

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE
BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 200k Epson drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

NEW LOW PRICE
Only £1,089



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

MICROVITEC

- 1431 – Medium resolution as used on the BBC television computer programme **£165**
- 1451 – High resolution, suitable for word processing in mode 0 .... **£237**
- 1441 – High res, exceeds the capabilities of the BBC micro **£385**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£285**
- Dust Cover for Microvitecs **£5.50**

All Microvitec Monitors are 14" RGB in their distinctive right angle sturdy metal case or the new beige plastic case. They are supplied complete with connecting lead to the BBC and a 3pin mains plug.

KAGA

- KAGA Vision 2 High Res. Colour **£225**
- KAGA Vision 3 Super High resolution, Colour **£310**

Kaga Monitors are 12" RGB colour units housed in an attractive beige plastic cabinet. They all have as standard, a genuine etched anti-glare screen.

ZENITH

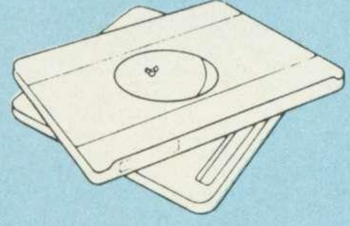
12" Ultra high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics .... ONLY **£66**

LEADS

BNC Lead for Zenith or Philips **£3**
RGB lead for KAGA **£5**

N.B. Carriage on Monitors **£7** (securicor)

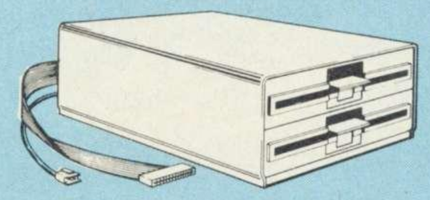
SWIVEL BASE FOR MONITORS



Only £15

DISC DRIVES PRICES SLASHED

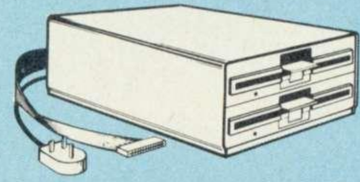
(ALL DRIVES NEW SLIM-LINE)



(DRIVES Cased with Cables. No PSU. Connects directly to the BBC's power socket.)

- **CLS 100** Single, TEC Single sided 40 track 100K, $5\frac{1}{4}$" Disc Drive **£89**
- **CLS200** Single EPSON Drive, Double sided 40 track, 200K, $5\frac{1}{4}$" **£99**
- **CLS400** Single, Mitsubishi/Epson Double sided 80 track 400K, $5\frac{1}{4}$" Disc Drive **£126**
- **CLS400S** Single, Mitsubishi/Epson Double sided 40/80 track Switchable, 400K, $5\frac{1}{4}$" Disc Drive **£135**
- **CLD200** TEC Single sided 40 track 200K twin $5\frac{1}{4}$" Drives **£165**
- **CLD400** Epson, Double sided 40 track 400K, $5\frac{1}{4}$" TWIN Drives **£199**
- **CLD800** Mitsubishi/Epson Double sided 80 track 800K, $5\frac{1}{4}$" TWIN Drives **£235**
- **CLD800S** Mitsubishi/Epson Double sided 40/80 track switchable, 800K, Drives **£269**

DISC DRIVES CASED WITH PSU & CABLES



- **CS100** TEC Single sided 40 track 100K $5\frac{1}{4}$" Single Disc Drive **£119**
- **CS200** Epson Double sided 40 track 200K $5\frac{1}{4}$" Single Disc Drive **£139**
- **CS400S** Mitsubishi/Epson Double sided 80 track 400K $5\frac{1}{4}$" Single Drive **£149**
- **CD200** TEC Single sided 40 track 200K $5\frac{1}{4}$" TWIN Disc Drives **£205**
- **CD400** EPSON Double sided 40 track 400K $5\frac{1}{4}$" TWIN Disc Drives **£215**
- **CD800** Mitsubishi Double sided 80 track 800K $5\frac{1}{4}$" TWIN Drives **£295**
- **CD800S** Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives **£299**
- DFS Manual (comprehensive) **£7** (No VAT)
- TWIN Disc Drive CASE with Power Supply to house your own Drives **£38**

N.B. All single Drives with Power Supply will be supplied in a twin Case for later inclusion of a second Drive.

(Carriage on Disc Drives £7 securicor)

P.S.
- You do not require a formatting Disc nor the expensive 40/80 track switchable Drives when using Watford's sophisticated Disc Filing System which has this facility as one of the many facilities incorporated in it as standard.

Cont.

- MITSUBISHI & EPSON Slimline 400K Disc Drives that we supply are Double sided Double Density, 1 Megabyte unformatted, (With BBC Micro 400K after formatting). When used in conjunction with our Double Density Interface, you obtain 725K formatted. Track density is 96 TPI, track to track access time is 3mSec. These drives are very fast, quiet and efficient. We strongly recommend them.
- Extensive test carried out in our workshop has proved that the BBC Micro's own switchmode power supply is capable of driving 2 disc drives and a host of Sideways ROMs without undue heating. We recommend our CLS & CLD range of Disc Drives which will save you considerable expense without sacrificing performance.
- Please send an SAE, for further technical specification on our Disc Drives.

DUST COVERS

(For our Disc Drives)

Single (without PSU)	**£3.20**
Twin (without PSU)	**£3.85**
Single (with PSU)	**£3.25**
Twin (with PSU)	**£3.90**
Twin (side by side with PSU)	**£3.95**

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only **£32**

TINY PASCAL for BBC Micro £54

NEW LAUNCH

ROM-SPELL

A ROM based fast spelling checker essential to serious word processing users of the BBC micro.

Compatible with the popular word processors VIEW, WORDWISE and also with *SPOOLED text files. Allows misspelt words to be changed without returning to the word processor. Simply load the text and execute the spelling checker, correcting the words as you go along, or all at once at the end.

An optimised word compacting technique gives a comprehensive 30,000 word dictionary as standard as well as a user defined dictionary for specialist applications. Efficient data storage also means faster operation, text can be checked at 160 words per minute!!! Equivalent to looking a word up in a standard dictionary in well under half a second!

An ambiguous word checking facility allows partially spelt words to be checked against the dictionary and all the matches displayed. This is ideal when you are uncertain of a spelling and a boon for crossword addicts!

Full access to the dictionary from BASIC allows users to check words from within their own programs. Useful for educational programing and also to compilers of word puzzles and anagram solvers.
Save time spent looking in dictionaries, use ROMSPELL.

ROMSPELL is supplied on a ROM with the dictionary disc and full instructions for Only:

£25

(Please specify 40 or 80 tracks when ordering)



THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only
£5.95 (Book – No VAT)

EPSON FX/RX NEAR LETTER QUALITY PRINT ROM



Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is incredibly easy to fit and use. Supplied complete with Manual.

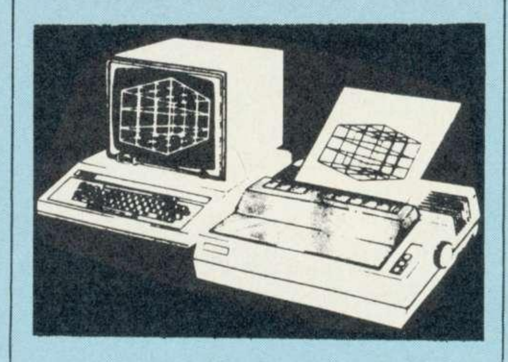
Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

DUMPOUT 3
NOW WITH EXTRA FEATURES!



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!

The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.

Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any Mode (including Mode 8). There are many optional parameters but you need only specify the parameters you wish to change.

- V <scale>, H <scale> – These 2 byte numbers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs, scale works the same in all modes inc. mode 7.
- R <0-3> – Print dump rotated by 0, 90, 180, 270 degrees.
- I <indent> – Set gap from left edge of paper.
- X <min><max>, Y <min><max> – Selects screen area, by default the whole graphics window is dumped.
- P – Dump shows physical colour values.
- G – Grey scale reproduction, dumps otherwise use a negative scale (white prints darkest).
- T Two tone dump for maximum resolution.
- M <mask> – 8 bit colour mask.
- E – Contrast expansion to make mode 7 text and separated graphics stand out clearly from the background.
- C – All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.
- K – Key-triggered dump. The dump does not commence immediately, but can be triggered off later by pressing <SHIFT><0> or <CTRL><ESCAPE>.
- S – Switch-triggered dump. As K, but the trigger is an external switch (not supplied) connected to the user port. The S option can still work with games that corrupt RAM page D.

*TIMAGE <indent> – Does a fast, text only, dump of the contents of the text window in any mode.

*GWINDOW and *TWINDOW – These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. Note that GIMAGE and GWINDOW work fully in mode 7.
Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.
Price including comprehensive manual

£24

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required). **£9**

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £8

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED
(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

Only: £8

BEEB PRINTER ROM



This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.
Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely.
Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features . . . String searching, Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer.
File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.
The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are –, +, *, /, +–999999 9999.9999 and compare facilities =, >,<>>=, >=, <, &,.
Many keywords are supported by the language: assign, compare, display, and, goto, iff, ift, print, read, search, spool and update.
Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer: **£105**

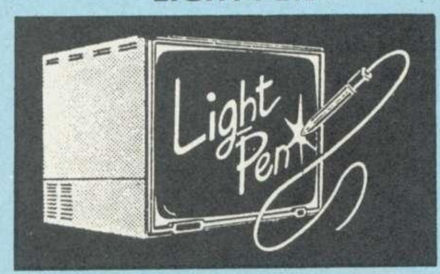
PEN PAL–VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

- Pixel, Line and Character definition
- Free hand drawing
- All Colours
- Fill, Refill and stripes
- User defined "Brush strokes" plus character definer
- Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
- Move design/character to any screen position
- Save and Load screens, User defined characters and line drawings for video titles, own programmes etc.

This program has many uses in education and at home. It is supplied with a comprehensive instruction manual.
Works with Watford, RH, Acorn User, DIY and many other Light Pens.
Prices TAPE .... **£11;** .... DISC **£12**

LIGHT PEN



This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only **£23**

(For software on disc please add £2)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10**

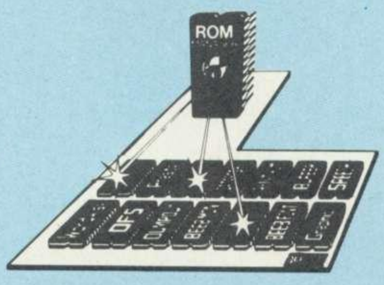
(Please specify whether 40 or 80 track disc when ordering)

ADE

Systems complete program development package in a 16K ROM. Full assembling and debugging facilities provided. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ROM MANAGER



'Provides comprehensive management of all your installed ROMs – BEEBUG Nov. '84'.
This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.
The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price **£22**

BUFFER & BACKUP ROM

For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

★ 4K or 16K buffer for parallel printer.
★ Dumps selection of Disc files to Tape.
★ Makes backup copies of tapes on to tape and disc.
★ Displays contents of paged ROMs on screen.
★ Menu display of ROM filing system contents on Shift-Break.
★ Comprehensive manual.

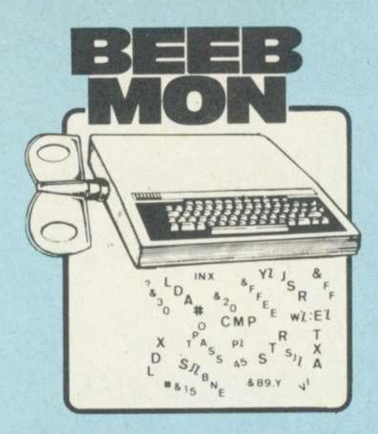
Only £22

ULTRACALC 2

The mark 2 version of the BBC Publications extremely popular electronic spreadsheet ROM. Features include: Simple communication with program, with many prompting messages; Full range of editing commands; Efficient memory usage, allowing large spreadsheets to be constructed; The handling of labels, as well as numbers, as values; Individual variations of the width of columns; Display available in all screen modes; Operates as HICALC on 6502 2nd processor giving 44k of workspace; Flexible printer controls.

Only: **£66**

Continued →



Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.
In use as a debugging tool, you run code under a total emulation system. Ever felt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.
Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a virtual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£24

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.
A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.
Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY **£18**

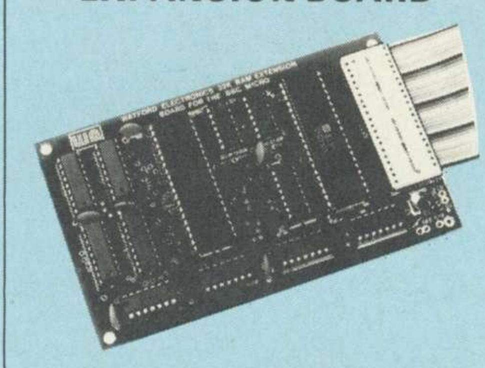
Now
Available

"Acorn Speech Synthersizer"

"We can now supply the official Acorn speech chips, manual and full fitting instructions.

EXTRA SPECIAL PRICE
ONLY: £19.50

32K RAM
EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. It's ribbon cable simply plugs into your micro's 6502 processor socket. This compact board which fits inside the computer doesn't just give you 16k or even 20k of extra RAM, but a massive 32K!!!

There are many more useful facilities available with this board:

● The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, etc. and NOW COMPATIBLE with Beebug's TOOLKIT.

● The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER buffer for SERIAL PARALLEL printers, sound channels, RS423, keyboard or speech synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it. eg. *FX15,21, 138, 145, ADVAL(—no.) etc.

● This board is the IDEAL COMPLEMENT to any WORD PROCESSING system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on – TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +).

● Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion boards, double density DFS units, and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can either be left in the micro or stuck to the lid with the 4 self adhesive feet supplied.

● The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

● Now the ROM has had a host of utilities added to the large number already provided and has been made even easier to install.

Only: £65

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

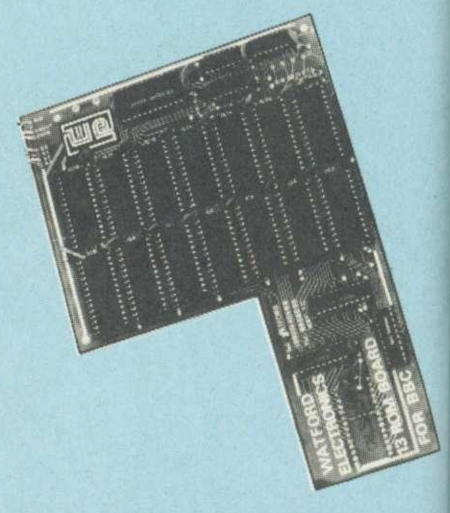
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.
You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.
A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£32**

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.
Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead). Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions.

Only £30

PCB NI-CAD Battery for ROM Boards.
£2.75

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
TERMI	£27
COMMUNICATOR	£58

Wordwise

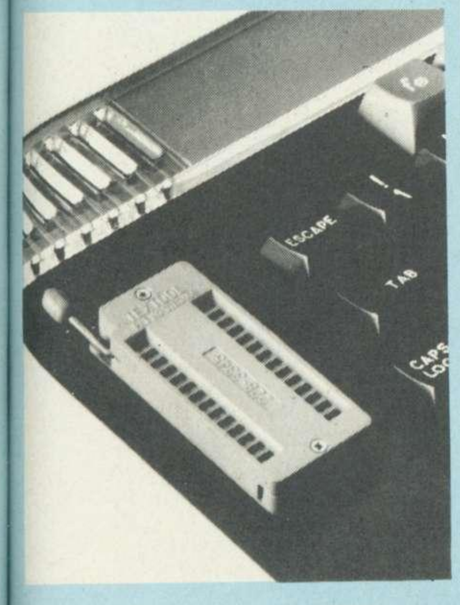
Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

WORDWISE PLUS

Now available from stock **£47**

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£18**

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for £17. Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.

£17

BEEBUG SOFT

SLEUTH ROM	£25
TOOLKIT ROM	£23

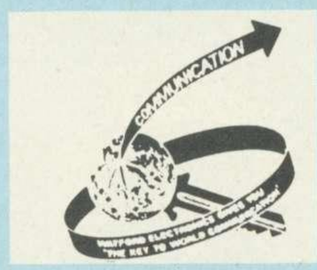
ACORN 1.2 DNFS ROM	£15
ACORN 1.2 OS ROM	£10
ACORN BASIC 2	£20

APPR[redacted]for use
with teleco[redacted]on systems
run by Britis[redacted]munications
in accorda[redacted]e conditions
in the ins[redacted]ns for use.

MODEM 84

PRESTEL TERMINAL

For the BBC Microcomputer



The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200 baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM. Please write-in for full technical literature.

PRICES

MODEM 84 (with Lead & Manual)	£55
MODEM 84 complete with PRESTEL SOFTWARE ROM, Lead and manuals	£75
PRESTEL SOFTWARE ROM +Manual	£20
USER to USER 1200 BAUD SOFTWARE ROM	£18

(At these incredibly low prices for such a sophisticated BT Approved Prestel Terminal, Modem 84 has to be the best buy around)

(Carriage on Modem *£2*)

Nightingale Modem

Now Watford brings you PACE's NIGHTINGALE MODEM PACKAGE including the popular Commstar ROM software for the BBC Micro. Nightingale is considered to be by far the most versatile BT approved modem available at the price for the BBC Micro. It is ideal for home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) as well as 300/300 baud full duplex for communication between BBC and other computers, including bulletin boards. A bargain at our

SPECIAL INTRODUCTORY OFFER

(Price includes COMMSTAR ROM & comprehensive manuals) **£119**

COMMSTAR ROM package **£29**



16K DISC RAM

This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM.

Only: **£39**

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile **BEEB SPEECH SYNTHESISER** Unit



SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

SPECIAL OFFER £35

Continued →

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
6502 Application Book	£11.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC MICRO add on guide	£6.95
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
BBC Software Projects	£5.95
Brain teasers for BBC micro	£5.95
CP/M Handbook with MPM	£11.95
CP/M The software BUS	£8.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
DIY Robotics & Sensors with BBC	£6.95
Easy Programming for the BBC Micro	£5.95
Exploring FORTH	£6.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Can Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphs & Charts on BBC Micro	£7,50
Graphic Art for BBC Computer	£5.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Introducing the BBC Micro	£5.95
Introducing LOGO	£5.95
Introduction to PASCAL	£14.95
Let your BBC teach u to program	£6.45
LISP	£9.25
LISP Cassette	£15.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£13.65
Programming the 6502	£11.95
Programming the BBC micro	£6.95
Programming the Z80	£14.95
Programming with Graphics	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£6.95

Watford brings you

THE AMX MOUSE

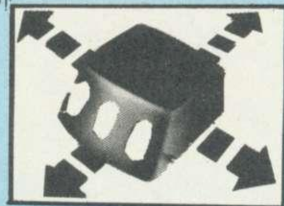
'The program is simplicity itself and the user manual is virtually redundant' . . . Micro User Jan. 85.

Bring into your home or office the last word in user friendly input devices for the Beeb. The AMX MOUSE that won the hearts and the minds of thousands of visitors at the Show has arrived at Watford Electronics at a very special price!

Using simple Icons, and small movements of the mouse on a work surface, you can select any one of the functions from the pull down menus. The mouse will operate from within Wordwise, View and many other software packages. The three buttons built in to the mouse are user programmable for many extra functions.

The package consists of the mouse, the advanced controlling software in ROM and a disc containing the Icon designer and the AMS ART software.

To summarise this superb prodnct a comment passed by a very senior authority on BBC micro at the last Micro User Show was, 'My only criticism of the product is that, IT'S TOO CHEAP!'



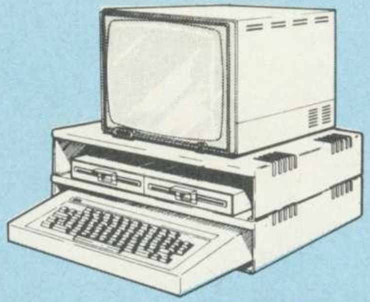
OUR SPECIAL PRICE

ONLY: £68.50

AMX Art Utilities Disc **£12.95**

AMX Desk Disc **£21.50**

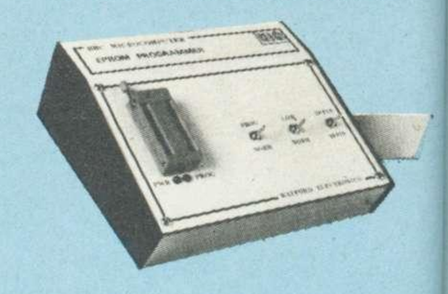
PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

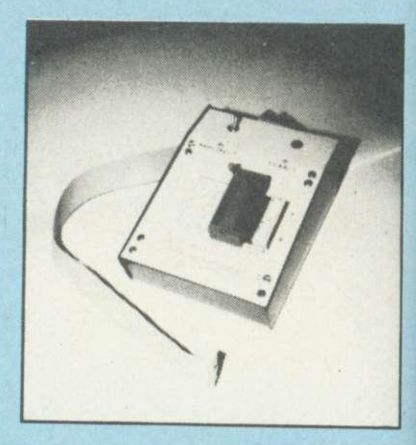
SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.



The features are:
- Will program 2716, 2732, 2532, 2764 & 27128 EPROMs.
- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory.
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

An Introduction to Computer Programming

Realise the Potential of your Computer

R.R.P. £18.95

© Video Classroom

THE BBC & ACORN ELECTRON

First Steps in BASIC

The user guides which are supplied with the BBC Computer and the Acorn Electron are excellent reference books.

There are also lots of very worthy books on sale which attempt to teach people how to program in BBC BASIC.

However learning a complex subject from books alone can be a very boring and daunting process.

There is a need to present the essential elements of computer programming in a more interesting form, so that students can gain the basic knowledge they require in order to further their studies, using the many books which are available.

The VIDEO CLASSROOM is designed to meet this need.

Other subjects in the VIDEO CLASSROOM series includes:

First steps in BASIC for Sinclair Spectrum, the Commodore 64, Amstrad 364/464 and the first steps in MSX BASIC.

For more details on the 'Video Classroom' Clip this Coupon

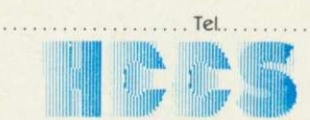
Name. . . . .

. . . .

Address. . . . .

. . . .

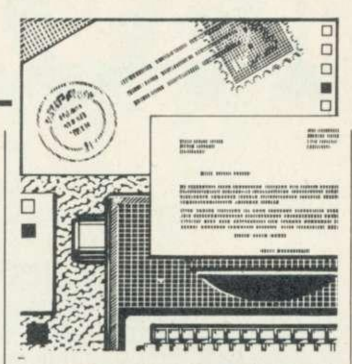
. . . . Tel. AU1/3/85





Home & Continental Computer Services Ltd.
Market Square, Biggleswade, Beds.
Telephone: Biggleswade (0767) 318844

Video Classroom comes from the originators of the Gemini Integrated Business Systems



This one will run and run

Sir, *Acorn User* ran a review of the Acorn Z80 second processor and the CP/M bundled software [June 1984]. On the strength of this article, I decided not to buy the Torch Pack and rushed out and twisted Technomatic's arm to sell me their last Z80 unit before I left to work in Iran.

As night life in Tehran is not what one would call hectic I have been systematically working through the Acorn bundled software. I have now arrived at the Mallard Professional Basic package.

Acorn supply a beautiful glossy ring-binder on the Z80 Professional Basic which lists all the Basic statements allowed – such goodies as WHILE. . .WEND, etc, which leaves me drooling. But when I run the Basic CP/M disc and type in PBasic, besides the usual splurge about copyright, the screen tells me that this is a 'Run-only program'. When I try to enter my own Basic statements from the keyboard I get the genteel rebuke 'Mistake-Direct Mode'.

The Acorn manuals are distinctly coy, simply saying 'you will be more likely to use BBCBasic to run your own programs and use PBasic to run programs written by professionals.' Your reviewer last June skipped the whole problem, simply commenting that 'Mallard is a more Microsoft-type Basic'.

Don't think I am blaming you for my problems with PBasic but please tell me is this PBasic a con? How can I join that band of 'professionals' to write programs in a 'more Microsoft Basic' for my own computer? Where can I buy programs written by these 'professionals'? Am I a victim of the CP/M virus and simply have to hit CONTROL and Q at the same time to open the magic door? What is a 'Run-only' program?

John Hunt
Tehran
Iran

Richard Boyd of Acorn replies: The first page of the Z80 Professional Basic User Guide gives the information that the system, as implemented, is 'Run only'.

Acorn decided to implement the Basic in this manner to give users the option of using software written in this Basic, eg, *Accountant* and *Nucleus*, without the need to write their own software since they already have the use of BBC Basic to write their own programs 'interactively'.

Basic on most micros is 'interpreted' so that a user can write his program and the Basic will interpret each line as he types it in. This is totally different from most other 'high' level computer languages, eg, Cobol, Pascal or Fortran, which usually have to be written in an editor, compiled and then run.

Acorn has implemented the last two parts of this procedure ('compile' and 'run') but still allows the user to write his own program using an editor, eg, *MemoPlan*.

To write a Z80 Professional Basic program you should enter *MemoPlan*, enter 'LINE' mode (which does not insert its own carriage returns), type in the program and 'write' to disc with a '.BAS' extension to the filename.

This program can then be run by typing in PBasic filename .BAS which will run the program you have stated.

Torch mystery solved

Sir, Having read Paul Beverley's article on Second Processor timings (*AU* January), and discovered that you are no further forward on the Torch 'mystery', I started my own investigations. I think I can now reveal all!

I can confirm that the effect is caused by the periodic 'polling' of the I/O processor to test whether the Escape key has been pressed. The significant factor is that, when the test is made, the I/O processor must complete any operation it is performing before returning the Escape status to the Z80. Therefore, if the Z80 chooses to test for Escape just after it has issued the DRAW command it must wait for the completion of the DRAW and therefore the parallelism is 'lost'. It happens that the Z80 does not test for Escape after every statement but only after every ten; and this lessens the slowing effect of this test! The phasing of the escape test with respect to the FOR . . . NEXT loops will therefore vary, giving rise to the odd effects discovered.

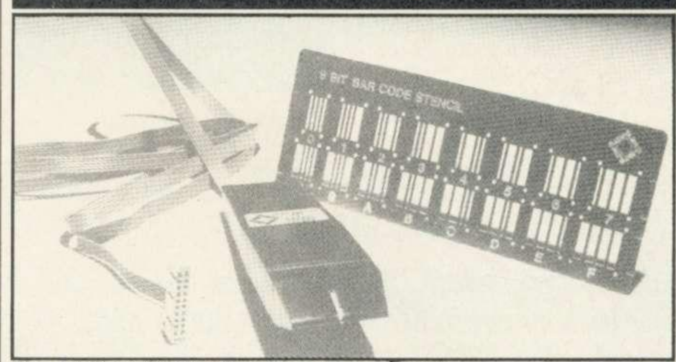
Fortunately, this effect is readily mitigated, albeit by poking into the code of Basic (ugh!). By changing the value of a byte in the Z80, we can determine how often the Escape key is tested: the appropriate byte is &3619 (version 1.92) or &37C4 (version 2.30). If this byte is set to zero, Escape will be tested only after every 256 statements. Adding the following line to the program:

5 ?&3619=0 : REM. for version 1.92 (&37C4 for version 2.30)

makes the 'parallelism' figure consistently about 85 per cent. To restore the normal rate of testing, the contents of this byte should be returned to 10. Other values can be experimented with: a value of one results in Escape being tested after every statement and the parallelism all but vanishes!

Richard Russell
Kent

Fast error-free programming



The Addison-Wesley Bar Code Reader pack

Sir, I have recently acquired a Bar Code Reader and am very pleased with its operation. To be able to put a long program in the computer without any typing errors and in such a short space of time is a boon.

I must say, however, that I did not find it easy to start with. The speed taught by the *Scan* program was far too fast – once I slowed down my scan, the programs went in without trouble. The two essentials I found necessary to load every scan were an absolutely flat surface to read off and an even movement of the scanner. I have just entered 80 lines of bar code with only two repeat scans – something I despaired of in the first few hours of practice.

I am interested in buying an expansion board to take care of the screen memory leaving more room for the program. However, where is the software to justify this purchase? Writing long programs is not my *forte* at present so there would need to be software available first. Why don't the manufacturers of these boards sponsor programs which would provide an incentive to users to purchase their products? There must be many programs written for 48k machines that could be adapted.

Allan Miles
Devon

Sir, I have been very pleased with the programs in Bar Code format that have been printed in the last few editions of *Acorn User*. Having just received my Bar Code Reader I'm keen to obtain as many listings as possible. The whole idea of Bar Codes appeals to me greatly, as little can be said for my typing.

An excellent idea from a truly excellent magazine, with first class service.

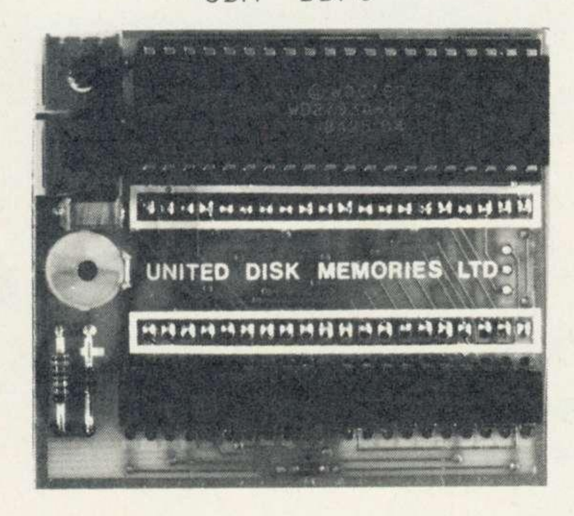
Dennis Cornfield
Sunderland

page 59 ▶

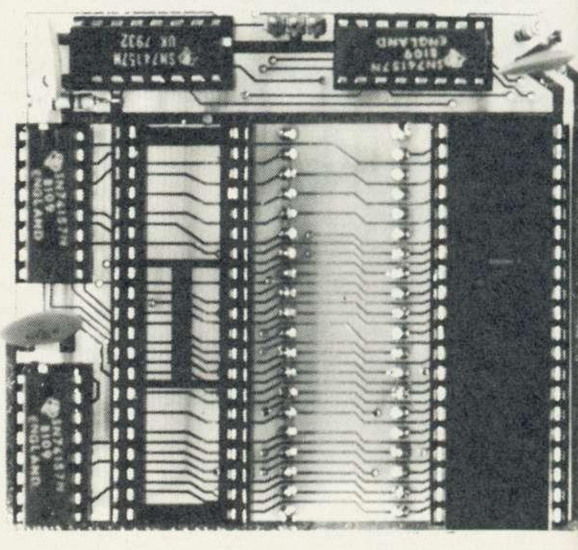
ASK a silly question, pass a fair comment, stage an angry protest – we don't mind what you write to us about (or about us!). Keep 'em short, keep 'em sweet, but keep 'em coming! The address is: Letters, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

NOW 2=100%

UDM DDFS







" 100 % " BOARD

YES IT IS NOW POSSIBLE !

NOW YOU HAVE THE OPTION OF WHICH FILING SYSTEM TO USE.
SIMPLY INSERT OUR NEW "100%" BOARD INTO THE 8271 SOCKET, RE-FIT YOUR UDM DDFS INTO THE NEW "100%" BOARD, AND YOU ARE READY TO GO.

BUT IF FOR ANY REASON YOU NEED TO USE AN ACORN DFS, THEN ALL YOU HAVE TO DO IS JUST PLUG AN 8271 INTO OUR NEW "100%" BOARD, ALONG WITH THE UDM DDFS, PLUG IN THREE TTL CHIPS IN YOUR 'BEEB, AND THE CHOICE IS NOW ENTIRELY YOURS.

THERE ARE NO FLYING LEADS TO SOLDER, NO TRACKS TO CUT, NO WORRIES ABOUT WHAT GOES WHERE.....HARDWARE/SOFTWARE SWITCHABLE; JUST CONNECT THE SWITCH AND MAKE YOUR CHOICE

THE "100%" BOARD IS AVAILABLE IN FOUR PACKAGES:

1. THE "100%" BOARD AND SWITCH ON ITS OWN.

2. THE "100%" BOARD AND SWITCH WITH 8271 AND TTL.

3. THE "100%" BOARD AND SWITCH WITH UDM DDFS.

4. THE "100%" BOARD AND SWITCH WITH 8271 AND TTL AND UDM DDFS.

END THE FRUSTRATIONS OF HAVING TO DECIDE WHICH FILING SYSTEM TO BUY.........

BUY THE UDM "100%"KIT,.......AND BE FULLY COMPATIBLE !

CALL/WRITE NOW FOR PRICES AND FURTHER INFORMATION.

DEALER ENQUIRIES WELCOME !



UNITED DISK MEMORIES LTD
Stanhope House
Fairbridge Road
London N19 3HP
01-281 2438

New routines for old printers

Sir, The program (Printer Driver for the Epson MX80) published in the March 1984 issue provides a wide range of facilities for the Mk3 version but is not directly applicable to earlier versions of this printer. Users with access to the older Mk2 printer will need to modify the routines to obtain a satisfactory printer driver and will have to ensure that the highlight codes are used correctly in the *View* text files.

The changes required to the program published in March are as follows:

Delete the following lines: 290, 460, 500 to 530, 590, 670 to 710, 940, 980 to 1040.

Replace lines 420, 580, 890, 920 and 950 to 1060 with the following:

```
420 .Highlight
580 LDA&32F5:BEQ DoubleWidthOff :LDA#14
:JMP Out:.DoubleWidthOff LDA#20:JMP Out
890 PRINTTAB(0,10)"Select Test (Keys B,
C, D, L or M)"
920 REPEAT K$=GET$:K%=INSTR("BCDLMZ",K$
):UNTIL K%>0
950 IF K%=1 THEN PROCEmphasise:PROCPrin
t:PROCEmphasise
960 IF K%=2 THEN PROCDoubleWidth:PROCPr
int:PROCDoubleWidth
970 IF K%=3 THEN PROCCondensed:PROCPrin
t:PROCCondensed
1050 IF K%=4 THEN PROCEmphasise:PROCDoub
leWidth:PROCPrint:PROCDoubleWidth:PROCEmp
hasise
1060 IF K%=5 THEN PROCDoubleWidth:PROCCo
ndensed:PROCPrint:PROCCondensed:PROCDoubl
eWidth
```

Finally add a new line into the Print procedure definition, as follows:

1055 A% = 13:CALL Printer

When running the program the final address value printed out by line 820 will now read &32B1 (instead of &32EF) and only five test keys are supported. Having satisfactorily tested the printer driver, pressing key Z will save a file called EPSON which will be loaded by *View* in the normal way.

When using the Mk2 version of the MX80 it is essential that the highlight commands to switch off the condensed or emphasised modes are placed on the line following the end of the desired section. Placing these codes on the same line as the text that is intended to be condensed or emphasised will result in that text being printed in the normal mode.

It should also be noted that the double width mode is automatically cancelled by the MX80 Mk2 when a new line command is received. This will not cause problems where the double width text is used only for single line titles, but where longer passages are required in double width the highlight codes should be used on all lines with the double width on command at the start of each line and the off command at the end of each line. Other limitations worth noting are that condensed and normal sized text may not be mixed on a single line, and that a single word or phrase in a line of text cannot be emphasised (any attempt to do this will result in either all or no text being emphasised).

Since underlining is not supported by the Mk2, some users may prefer to allocate a different function to highlight code 128 and a useful facility would be the double width mode. To do this it is only necessary to change the CMP#130 intruction in line 440 to CMP#128 and the LDA&32F5 in line 580 to LDA&32F3.

Tony Rudkin
Herts

All the Ns are prime numbers higher than 1 (ie, 2, 3, 5 or 7):

```
  NNN
   NN*
-----
 NNNN
NNNNØ
-----
NNNNN
-----
```

What is the result of the multiplication?



Michael Furminger: new programs forecasting the weather

Satellite software packs

Sir, In the August 1984 issue of *Acorn User*, Robin Mudge wrote about my work at Nene College on satellite reception for weather pictures.

As a result I have received many interested enquiries as to how the BBC micro can be used as a satellite decoder, and requests for information about good, cheap equipment sources, as well as helpful comments on the software.

I have produced two new software packs which cover the needs of most users. These allow both mode 1 and mode 2, distortion corrected pictures to be displayed. The special feature of Pack 1 is that no external clock is required, it uses the powerful features of the 6522 VIA to provide picture synchronisation. Pack 2 allows people who require stored reception, or users of my old hardware interface, to gain the benefits of the new software. Both packs, as well as the low-cost interface and receiver are available from Timestep Electronics of Wickhambrook, Surrey. The packs cost £9.95 (cassette) and £12.95 (disc).

Michael Furminger
Northants

Easy editing

Sir, I read with interest Jacquetta Mergarry's article on *Wordwise Plus* in the February issue of *Acorn User*.

I am a user of *Wordwise Plus* and find it extremely good. It has features and qualities of word processors costing several times the price.

I must say that I found the example *Wordwise Plus* program given in her article of absolutely supreme value. For those readers who may have missed the article, it listed a program that would delete every tenth word from the text being processed.

Now I know how journalists manage to fit their articles into the space available!

Graham Allan
Kent

Board is not the issue

Sir, I recently bought a 6502 second processor for my BBC micro which does not work because I have an Issue 3 board. The 6502 second processor is not compatible with Beebs that have issue 3 or 4 boards.

I am waiting for my dealer to get the bits from Acorn to make the necessary modifications.

My complaint is that Acorn do not inform a purchaser that if his micro has an issue 3 board it will need modifying. A note should be included in the documentation to this effect. Since the item is sold by mail order and people insert the ROMs themselves (maybe thinking they have damaged it), this is quite important.

Peter Mott
Lancaster

Dave Bell of Acorn replies: the 6502 and Z80 second processors should work with all versions of the BBC model B PCB. If you have any specific problem with the system then consult your dealer for assistance, as in your case. For information, I use a 6502 second processor with an unmodified issue 3 BBC micro PCB.

page 61 ▶

PINEAPPLE SOFTWARE

Programs for the BBC model 'B' with disc drive with FREE updating service on all software

DIAGRAM

- A program which allows you to store very large diagrams - up to 39 mode 0 screens - and view or edit them by SCROLLING the computer screen around over any part of the diagram.



FEATURES

- Draw diagrams, schematics, plans etc., in any aspect ratio, e.g. 10*3, 2*12 screens.
- Access any part of the diagram rapidly by entering an index name, e.g. TR6, R5 etc., to display a specific section of the diagram, and then scroll around to any other part of the diagram using the cursor keys.
- Up to 128 Icons may be predefined for each diagram, e.g. Transistors, resistors etc., in full mode 0 definition, up to 32 pixels horizontally by 24 vertically.
- Hard copy printouts in varying print sizes up to 9 mode 0 screens on an A4 size sheet, compatible with most dot matrix printers.
- Many other features including, selectable display colours, comprehensive line drawing facilities, TAB settings, etc.
- Disc contains sample diagrams and two versions of the program, one of which will work from a 16k sideways RAM.
- Comprehensive instruction manual.

£25
including P & P
Supplied only on disc - 40T/80T compatible
All orders sent by return of post.

BASIC COMPILER

- A really professional Basic compiler for the BBC micro enabling you to write programs in basic which may then be compiled into extremely fast 'optimised' machine code. The program allows the use of a large number of Basic keywords, and long programs - up to 11k of compiled code - may be compiled directly. Larger programs may be produced by using built in overlay techniques

FEATURES

- Keywords - *Fx, ABS,ADVAL,AND,ASC,CALL,CHR$, CLG,CLS, COLOUR, DEF,DIM,DIV,DRAW, ELSE,END,ENDPROC, ENVELOPE, EOR,FALSE,FN, FOR,GCOL,GET,GOSUB,GOTO,IF,INKEY,INPUT, LEN,LET,LOCAL,MOD,MODE,MOVE,NEXT,NOT,ON,OR,PLOT,POINT, POS, PRINT,PROC, REM,REPEAT,RETURN, RND,RUN,SGN, SPC, SOUND,STEP,STOP,STR$,TAB,THEN,TIME,TO,TRUE,UNTIL,USR, VAL,VDU,VPOS and any O.S. command. (statements starting with *)
- String handling using $ indirection operator.
- Handles 16 bit signed integer numbers.
- Nesting of loops and procedures, and parameter passing for functions and procedures.
- Assembly language statements may be incorporated into the basic source code.
- Library routines may be stored on disc and incorporated into any compiled program.
- Comprehensive instruction manual.

£25 **including P & P** Supplied only on disc 40T/80T compatible. **All orders sent by return of post.**

PINEAPPLE SOFTWARE, 39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL

NEW forth microcard system

Forth

microcard

* Special Introductory Pricing
- FORTH MICROCARD £119
- I/O MODULE DRIVER £78
- FORTHWRITER DISK £48
- SUBSTANTIAL DISCOUNTS FOR LARGER QUANTITIES

The Essex Forth Microcard measures only 10cm × 8cm but it is equipped to take on ambitious control tasks using the powerful FORTH Programming Language.

You can use the **Essex Forthwriter** disk to turn a BBC 'B' computer into a flexible workstation during program development but from then on the Microcard stands on its own.

The **Essex Module Driver** directly interfaces between mains level input/output signals and the Forth Microcard to provide safe and easy power control.

- R65F12 Processor with on chip Kernel
- Interactive Extended Fig FORTH Programming and 6502 Macro Assembler with FR1 Development ROM
- 40 Input/Output Lines and two programmable timers
- RS232 Interface and Autostart Operation
- BBC Compatible Development Tools

SEND TODAY FOR OUR INFORMATION PACKAGE ON THIS REVOLUTIONARY SYSTEM

Essex Electronics Centre
UNIVERSITY OF ESSEX
COLCHESTER
ESSEX
CO4 3SQ

First the good news

Sir, After reading David C Morris's letter from Sheffield about *Elite* not working on the Microware DFS, I thought I must write and tell you the good and bad news.

If your DFS is made by UDM and will not work on *Elite* (and many other programs, eg, *Mini Office*) then it is an old 1.95, 1.1 or 1.98 system. However, this can be upgraded to *Office*, *Labyrinth*, Clares' *Replica II*, etc, with no problem, but seems to take rather longer to load than the Acorn DFS.

Now the bad news. It cost me £12.50 to get the new ROM and I had to send the old one back.

The ROM in question is positioned at the right-hand side of the micro under the keyboard. It is in either IC 88 or IC 100 or somewhere near. Send this and a letter explaining the situation to United Disk Memories, Stanhope House, Fairbridge Road, London N19 3HP. Also ask for a new Disc Drive Manual as there are a few extra commands with the new ROM.

I hope this will help Mr Morris and other readers to get the most out of their DDFSs.

J N Willmott
N Humberside

How big are turtle steps?

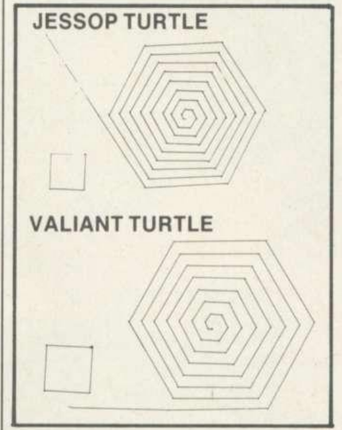
Sir, I was amazed by M P Doyle's letter in the February *Acorn User* which complained about the 'arbitrary units' used by the Jessop and Valiant turtles.

What is sacred about 'conventional units'? (They were, of course, arbitrary before they became widely accepted.) Which conventional units would Mr Doyle wish to use? Inches, centimetres, picoparsecs? What is this 'reality' of which Mr Doyle speaks – there is no special reality in units of conventional measurement, and nothing that a child cannot learn about geometry using non-conventional measurement systems.

Any line can be measured with a ruler. Let the child discover the relationship between inches and turtle units. Teach the turtle to draw a 'turtle unit ruler', cut it out and use it to plan your future class work.

But if you must, just tell LOGO (REDEFINE) to move the turtle in centimetres (or rods, poles and perches), and hide the change away (BURY) so that the children don't find out!

Dr Hamish Macleod
University of Edinburgh



The Valiant Turtle takes larger steps than the Jessop Turtle – but neither uses conventional units of measurement

Records bonus in database change

Sir, As a Beeb owner I was very pleased to find Mike Fryer's database program listing in the December issue of your magazine.

However, when typing in and taking a close look at the program I discovered some interesting changes could be applied. After a couple of hours' work my version appears to save quite a large amount of memory space.

I'll explain the changes I've made in my listing:

I thought it would be faster and simpler to check if there is a keyword in a record during the deletion process, instead of checking it in advance. The secret of my solution lies in the positive and negative values of m% and of the INSTR() − 0.5 statement. The addition of commas to k$ and q$(1,f% + 1) is necessary to prevent deleting or including records containing a keyword which is longer than k$.

As you can see, I split each record in two, and exchanged both parts, instead of putting the field on which the records have to be sorted in another array. For example, when sorting on the third field, d$(g%) (which was: aa#bb#cc#d-d#ee#) will be: cc#d-d#ee#aa#bb# during sorting. This method works faster than the one in your listing.

A B van der Bom
The Netherlands

```
1625 IF c$="D" THEN m%=-1 ELSE m%=1
1630 j%=0
1635 k$=","+ k$ +","
1640 FOR g%=1 TO e%
1650 PROCunpak(1,g%)
1655 IF m%*(INSTR(","+q$(1,f%+1)+",",k$)-0.5)>
0 THEN j%=j%+1:d$(j%)=d$(g%)
1660 NEXT
1665 e%=j%
```

Delete: PROComit, PROCsplit, in% (record%)

```
2080 IF ans%>1 THEN PROCrepak
2110 REPEAT
2120 flg%=0
2130 FOR g%=1 TO e%-1
2140 IF d$(g%)>d$(g%+1) THEN dum$=d$(g%+1):d$(
g%+1)=d$(g%):d$(g%)=dum$:flg%=1
2150 NEXT
2160 UNTIL flg%=0
2165 IF ans%>1 THEN ans%=f%+3-ans%:PROCrepak

3000 :
3420 DEFPROCrepak
3430 LOCAL k%,j%
3440 FOR g%=1 TO e%
3450 k%=0
3460 FOR j%=1 TO ans%-1
3470 k%=INSTR(d$(g%),"¦",k%+1)
3480 NEXT
3490 d$(g%)=RIGHT$(d$(g%),LEN(d$(g%))-k%)+LEFT
$(d$(g%),k%)
3500 NEXT
3510 ENDPROC
```

Delete: d1$ (record%)

Mike Fryer replies: These ideas seem very sound and interesting. They should certainly substantially increase the number of records that can be handled.

However lines 2070, 2090 and 2100 should also be deleted, and the additional lines 3420 to 3510 should be renumbered 2181, 2182, to 2190 so that they form part of DBASE5 (so that the disc based system will still function properly). The approximate number of records (mr%) calculated in lines 740 and 1020 is now too low, and in both cases the formula should be replaced by:

mr% = (HIMEM − TOP − 1800)/(0.3*nc%): IF mr% > 200 THEN mr% = 200

Some readers have had problems with the Database program. It looks as if line 555 is mainly to blame. It's not obvious from the article that there is a space between the quotes at the end of the printed line and the beginning of the next. It should read:

555 $&C00 = "LOAD DBASE" + n$ + " " + STR$ ~(t%)

Other points to note are that in lines 510, 1200, 1240, 2370 the "¦" is produced by the SHIFT key. May I also suggest you replace the f in line 130 by a 0 (zero) and the P%(f% + 1) in line 1220 by p%(f% + 1).

The art of printing £s

Sir, In the Letters column of your February issue, Mr Abel of Dunbartonshire wrote of his difficulties in getting a £ sign to print on his Shinwa CP80 printer.

The £ sign, several accent marks and other characters as well as a backspace character, will print on the Shinwa if a combination of Shift and the function keys is used.

If used in mode 7, this combination produces coloured text on the screen, but the embedded codes will produce these characters on the printer. The Shinwa manual makes no mention of them. Shift/f1 produces the £ sign.

D A Deaver
Saudi Arabia

FADE + DEAF + BEAD = ?

page 63 ▶

HARD OR



THE WINCHESTER HARD DISC DRIVE FOR THE BBC MICRO

- Available now!
- Ideal for Econet systems.
- Econet Level 2 compatible.
- Acorn DFS compatible.
- Fast ex-stock delivery.
- Low prices.
- Large capacities – 5, 20† & 25† Mb.
- Comprehensive user manual and utility software included.
- Simple installation.
- 12 month warranty. On site maintenance & extended warranty available.

† (Available April 1985.)

5Mb HARD DISC ONLY £850 + VAT
20Mb† HARD DISC WITH INTEGRAL FLOPPY DISC BACKUP
£1500 + VAT (guide only)

The ideal cost effective solution for Econet storage problems.

SOFT?



MIDWICH BBC COMPATIBLE FLOPPY DISC DRIVES

- Lower prices.
- High quality Japanese mechanisms.
- 100K to 800K storage capacities.
- Available with integral Disc Interface.
- Optional integral power supply.
- 12 months warranty.
- Complete with utilities disc and comprehensive user manual.
- All 400K and 800K drives are 40/80 track switchable.
- Improved design. Easier operation.

HC1	Single 100K – Alps	£ 69.95
BBC 400	Single 400K 40/80 track	£160.00
BBC 400D	Dual (2 × 400K) 40/80 track	£290.00
BBC 400P	Single 400K 40/80 track with integral power	£186.00
BBC 400DP	Dual (2 × 400K) 40/80 track with integral power	£320.00
BBC 400PI	Single 400K 40/80 track with integral power and Disc Interface	£246.00
BBC 400DPI	Dual (2 × 400K) 40/80 track with integral power and Disc Interface	£380.00

All prices exclude VAT and carriage.

Midwich Computer Company Limited, Gilray Road, Diss, Norfolk, IP22 3EU. Telephone: Diss (0379) 4131



CENTRAL PROCESSING... CENTRAL PROCESSING...

I Montgomery, Cleadon
Occasionally pound signs (£) have crept into listings – though we hope that they will not do so in future. But yes, when they have done they normally refer to the hash character (#).

For a comprehensive list of Epson control codes I suggest you purchase the February *Acorn User* listings cassette, where they are contained in a *Wordwise* format.

George Scerri, Malta.
To my knowledge there are no books containing detailed descriptions of the OSWORD calls &7A to &7E. These calls are mainly concerned with writing to and from the disc controller chip itself and as such are used by many software houses to implement their protection. The October 1984 issue of *Acorn User* gives some insight into these calls however.

Christopher Morris, Louth
You will need an RS423 interface for your Electron to be able to use a modem. Acorn will be producing one that will plug into one of the two cartridge sockets in the Plus-1, but I am unable to give a date for its launch.

Sgt Boyd BFPO 45
A checksum program for use in entering Basic programs is well under way – we hope to present it in the near future.

Francis Aries, Herts
Your problem is almost certainly due to some form of 'ROM protection' that prevents it being used in sideways RAM. Obviously I am not at liberty to disclose how you might be able to circumgate this.

T. G. Ward, Bideford
The program time specified for a 2764 EPROM is 50ms ±5ms per byte. However you can normally get away with a very much shorter time period, and the writers of programming software tend to take advantage of this fact.

I would suggest that your problem may have its roots in the software provided with your EPROM programmer, which is being just a bit too skimpy with its programming time.

Patrick Smith, North Shields
A good selection of Electron software can normally be found in larger branches of WH Smith. If you do have problems try writing to Acornsoft for their software catalogue.

B S Greenes, Gateshead
Yes it is possible to use the BBC micro to control a synthesiser in the manner you suggest, but you would need to use a good amplifier. A typical example of this type of application is the Music 500 package. I do not know of any books giving details of how to build this type of hardware.

Kevin Bowen, Cardiff
All the details of the activity board were published in the August 1984 issue of *Acorn User*.

R P Dennis, Mansfield
The fact that the same error keeps occuring tends to suggest that the problem is in the disc itself. No amount of sector re-editing will resolve this, so I would suggest you transfer the contents of the disc to a new one and discard the faulty disc.

T A Manning, Wirral
There is certainly enough memory for *Quadline* (January 1985) to run on the Electron. I suggest that you re-read the notes on how to enter the program.

Because of the large amount of technical enquiries we receive in the *Acorn User* office we are now unable to reply to individual letters. However, this new feature is intended to answer as many of your queries as possible, and should provide a useful information spot. Please keep your letters short and to the point.

```
     XX
     XX*
   -----
    XXX
   XXX
   -----
   XXXX
+   1XX
   -----
  XXXXX
```

This is an ordinary multiplication and addition sum. The Xs represent any digit. What's the result?

Kitty advises on communications – the equipment and terms used



Q I would like to use my BBC micro to gain access to one of the many bulletin boards that are now available. I am unsure exactly what a lot of the terms involved mean, so a gentle introduction would be most appreciated! Could you give me some advice as to exactly what equipment I am likely to need please, and what it will cost?

Linda Dhondy
Isle of Lewis

A First, you will need to purchase a modem. This is the box of tricks that connects your micro to the telephone, converting the signals that both require into a suitable format.

There are many different types of modem available, and at varying costs. One thing you must ensure is that the modem is BABT approved. This means that British Telecom have seen and approved the system for use with the national telephone network system. Using a non-approved system can be dangerous to both you and other users and you can be fined if you are caught at it.

Before deciding on your modem, evaluate what you will require from it. For example, if you are only interested in using Prestel with Micronet 800 and Viewfax, then a modem which could also use other boards might be an extravagant extra. In this case, a modem such as the Acorn Prestel Adapter would be more suitable.

Another term you will need to understand is baud. This simply refers to the speed at which data is transmitted and received by the BBC micro. Various combinations are used such as 300/300 (transmit and receive at 300 baud) for BT Gold, 1200/75 for Prestel, and so on. Many modems will cater for all: for example, the Minor Miracles WS2000 or the Nightingale by Pace.

The final term you should be familiar with is duplex; modems may be either full or half duplex. The former means that data may be transmitted in both directions at once; the latter is only capable of transmitting or receiving but not both together. Again most modems will cater for both.

Many also offer auto dial and answer options. The auto dial facility allows the modem to dial the number for you, and in many instances sign on to the board you are dialling. Auto answer allows you to set up your own bulletin board so that people may call you and leave their messages. You will need to dedicate your micro for this, however. Again, it's a matter of whether these are cost effective or not.

One final point on the subject of modems is to remember that you will need one of the new plug-in type phone wall connections to allow your modem to be connected. Most new phone installations will use these plug-in systems; older versions can be changed by BT for a small charge.

Obviously you will need some software to drive your modem, and it's best to have this in ROM. There are many packages around such as *Termi* and *Communicator* from Computer Concepts, *Comstar* from Pace and more recently the *Demon Zromm* from Rushworth Dales, which is very flexible. Some modems such as the Prestel Adapter come with software already included. Beware, though, if you buy an auto dial or answer modem that the software you select also has that capability. A dealer can advise you.

As to the cost, it varies enormously. You can spend between £60 and £200 on a modem, with software ranging widely in price (ROMs being more expensive). Have a look at the comparative reviews on modems and software in the February and April 1985 issues of *Acorn User*, and scour the advertisements.

LOGO

for the

BBC "B" MICRO

by

LOGO SOFTWARE LIMITED

LSL LOGO grew out of a feasibility study commissioned by the Department of Industry to develop a LOGO ideally suited for educational use in Britain.

LSL LOGO is the **only** LOGO to use a separator (a comma) between commands in the same line. This means that procedures in **LSL LOGO** are much simpler to understand.

LSL LOGO is the easiest LOGO to debug. There are 23 error messages which pinpoint bugs with unrivalled accuracy, and 9 debugging commands, including the unique **WALK** which enables the user to execute a procedure step by step.

LSL LOGO is the fastest and most efficient LOGO around. Its innovative **dynamic memory management** gives the user bigger and more flexible memory space, vastly extended levels of recursion and capacity for more procedures.

LSL LOGO comes packed on a single EPROM. Future developments include floor turtle and robot interfaces, a sprite board, and a range of supporting documentation including feedback, worksheets, and a procedure dictionary.

LSL LOGO is written in Assembler by a British software house. It makes full use of the BBC Micro's own operating system, and is readily accessible to advanced users wishing to customise their own LOGO.



LSL LOGO comes equipped with a lavishly illustrated 232-page manual, including the **Young Person's Guide to Logo**, the full **Technical Specification**, and **Quick-reference** section.

☆ FREE BOOKLET

A free 16-page booklet, **Why LOGO**, fully describes the history and the scope of the language. Write today for a copy, or ring 01-891 0989.

Please send ______ copies of **LOGO for the BBC B** @ £67.85 including VAT and P&P.

I enclose cheque/PO for £ ____________ or debit my Access No. [ ]

Name ______________________

Address ______________________

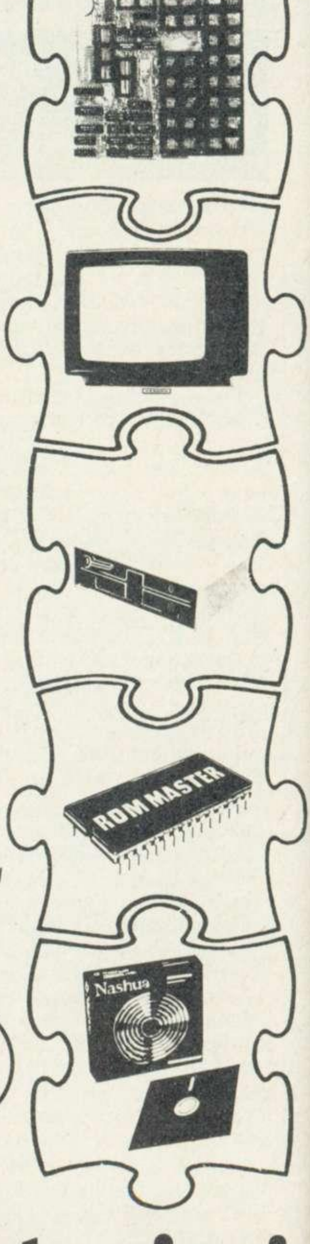
____

____

Signature ______________ Date ________

To: LSL, 316a Richmond Road, Twickenham, TW1 2PD.

the right bit...



CVX 16.2 ROM/RAM EXPANSION BOARD
- Up to 16 Roms fully buffered
- 16K Ram Option
- Write protect
- Battery Backup
- Same Name switching
- Simply Plug-in (no soldering/cuts)
- Full Documentation

£49.95 plus postage & packing £1.50

DECCA VIEWDATA RGB MONITOR
- Standard Resolution
- 1/P TTL/RGB
- Daisychain facility
- Built-in Speaker

£155 - including BBC cable + secure delivery £8 -

DISK DRIVES
400K 40/80 SW
Highest quality shugart SA 465
Slimline drives
- Direct connection to BBC
- All Cables Fitted

£149 - Single cased
£299 - Twin Cased + Secure Delivery £8 -

ROM MASTER
Sideways ROM/RAM UTILITY
- Load/Save Sideways Rom
- Powerful 2 pass labelling reverse assembler
- Save/Reload basic into S/W RAM
- List contents of Rom
- Disasembly to Disk
- Rom Disable - ROM
- Rom Map - ROM
- Direct Edit sidways Ram

☐ **Write enable/write protect**
☐ **Switch between & 08/& 09** } **CV x 16-2 only**
☐ **Link Configeration**

£19.95 plus postage & packing £1.50

NASHUA
Professional Quality Disks
MDI SSSD 40/T £14.95
MDID SSDD 40/T £16.10
MDZD DSDD 40/T £20.70
MDIF SSDD 80/T £25.30
MD2F DSDD 80/T £27.60
- All with Hub Ring
- Prices per pack of 10 disks

Plastic Library case **£1.50**
All prices plus £1.00 postage & packing

ALL PRICES INCLUDE V.A.T.

at the right price!



COMPUTER VILLAGE ☎ (0952) 506771
FREEPOST
Hazeldine House, Central Square,
Telford, Shropshire.

Please forward the following bits:-

	Quanitity	Unit Price +P/P	Total £
CV x 16-2 ROM/RAM Expansion Board		£49.95	
DECCA Viewdata RGB Monitor		£155.00	
Single Cased Disk Drives		£149.00	
Twin Cased Disk Drives		£299.00	
ROM MASTER		£19.95	
Nashua, Quality Disks			
		TOTAL	

Please find enclosed full remitance ☐
Please debit my Access/Barclaycard ☐

Number ....
Signature ....
Name ....
Address ....
....
Tel. No. ....

COMPUTER VILLAGE Hazeldine House, Central Square, Telford, Shropshire. Tel: (0952) 506771 FREEPOST

LOGO: THE BIG FOUR

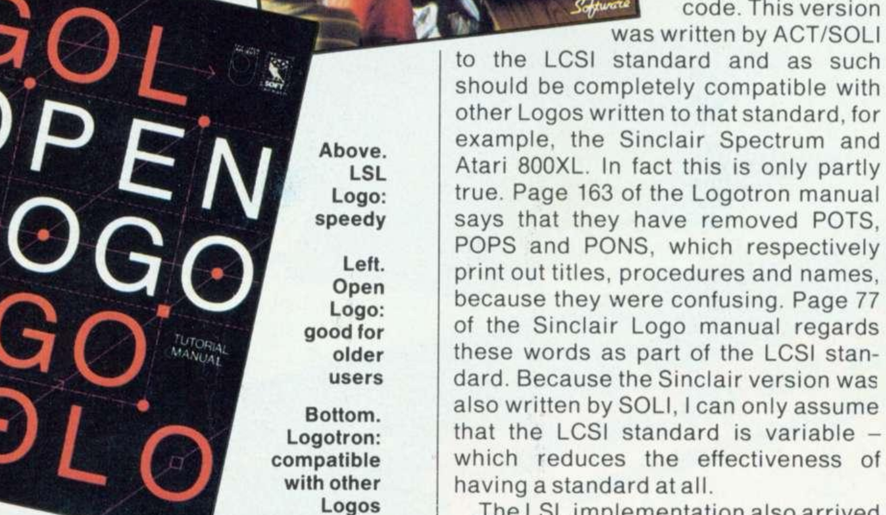
Joe Telford compares the major implementations of the language

Having introduced Logo to the uninitiated (April issue), and pointed out some of its strong points and failings, I'll now consider the implementations of Logo on the BBC micro. There are four major versions of the language currently available, from Acornsoft, Logotron and LSL, and Open Logo, developed by the Open University and produced by BBC Publications.

Introduction

The first thing to mention is that as we were hearing about Logo for the BBC micro two years ago, we might be forgiven for expecting that the final packages would be of a uniformly high standard. My impressions of all the Logos were somewhat reduced when I discovered that each had its own standard. This is fine, once you've learned it, but it requires a cross translator to transfer routines between dialects. This is a very sad state of affairs. Whatever the end product, we should be moving towards standardisation of Logo, with perhaps varying extensions.

I suspect a major reason for my annoyance at the differences in the languages is that it makes a comparative review more difficult. Each version has different strengths and weaknesses, and it becomes difficult to decide on an overall 'winner'. The approach I take in this review is to examine the four Logos in parallel and by sections.



Above. LSL Logo: speedy

Left. Open Logo: good for older users

Bottom. Logotron: compatible with other Logos

Acornsoft: wealth of commands

Overview of each system

Two of the four Logos (Acornsoft and Open Logo) were supplied with preproduction manuals. The Acornsoft implementation comprised two 16k chips, a tutorial manual and a reference manual. Also in the pack was a disc of extensions and demonstrations. Acornsoft Logo was written in BCPL by Chris Jobson and John Richards and seems quite close to the Apple Logo currently available.

The Logotron version came in its finished packaging and consisted of a manual in a ring binder plus a single 16k chip, written in machine code. This version was written by ACT/SOLI to the LCSI standard and as such should be completely compatible with other Logos written to that standard, for example, the Sinclair Spectrum and Atari 800XL. In fact this is only partly true. Page 163 of the Logotron manual says that they have removed POTS, POPS and PONS, which respectively print out titles, procedures and names, because they were confusing. Page 77 of the Sinclair Logo manual regards these words as part of the LCSI standard. Because the Sinclair version was also written by SOLI, I can only assume that the LCSI standard is variable – which reduces the effectiveness of having a standard at all.

The LSL implementation also arrived in its finished packaging, with a single 16k machine code chip and one manual. This version, which seems to have been some time in preparation, was written by Paul and Kay Crowe of Catsoft.

Open Logo came as two 16k chips (one being the language, the other including maths extensions), a tutorial manual and a reference manual. Also included was a disc of example programs and a second processor copy of Open Logo.

page 67 ▶

ROM SOFTWARE
For the BBC micro!

Reaches the parts of your micro that other BBC owners cannot reach

Disc Doctor

The ultimate utility ROM for the BBC micro

Computer Concepts

This utility package has many special features for use with discs, plus other utilities that everyone will find useful: Function key editing, powerful disassembler, recovery of data from corrupted discs, complete disc editor and compatible memory editor, string search in memory or on disc, built-in help menu, verifying and formating of 35, 40 and 80 track discs, and also a special format which allows 60 files on each side of a disc.

RRP 33.35 incl.

Available from all good BBC micro dealers or by 'phoning/writing to:



Computer Concepts

Gaddesden Place,
Hemel Hempstead,
Herts.
HP2 6EX.
Telephone: (0442) 63933



All the versions ran on the second processor although, because of its structure, Open Logo had to be loaded from disc (not necessarily a bad thing!).

The manuals

Both Open Logo and Acornsoft Logo had dot-matrix printed manuals, because they were pre-production copies. There were a number of typographical errors and diagrams were not included, but this should be corrected in publishing. Open Logo's tutorial manual uses an interesting style of writing which includes 'I did . . .' It always makes for good reading in narrative form, and is not unpleasant. Perhaps it emphasises the adventurous nature of Logo.

LSL have produced a spiral-bound manual with colour-coded sections, and one of the most interesting acknowledgements I've ever read twice. The sections include a children's tutorial, teacher's notes and a reference section. There are a number of typographical errors, but an enclosed sheet corrects them. Issue two of the manual was due to go to press and this would correct the copy to date.

Logotron's manual has been designed for expansion. In a glossy ring binder, the loose-leaf pages can be updated as new extensions appear. Several times the index informed me that a word was on page n, while it was actually a page or two earlier or later.

In both the Acornsoft and Open Logo manuals, items are very well explained, with the Open Logo manual being best in terms of information about the language syntax and extension to machine code. In my opinion, the Logotron manual is best at explaining Logo programming for the interested teacher or adult, while LSL's manual with its simple layout is easiest to use. Its 'Young person's guide to Logo' is also more appropriate for children than the other tutorials. The last page of the LSL manual has a set of perforated function key overlays, which can be fitted to the BBC micro to help with handling the editor.

Benchtesting

Table 1 demonstrates the speeds of the different Logos. Figure 1 contains the listings used. Both LSL and Logotron Logo perform well, with Logotron taking the edge. Acornsoft's *bête noire* seems to be list processing, while Open Logo seems to baulk at graphics.

The odd result for LSL in benchtest 6 reflects the lack of a machine code ATN function. This seems trivial, but without it conversion back to degrees cannot be performed.

Even the fastest Logo performs more slowly than Basic, but we should remember that in many educational situations all the Logos will perform fast enough for children. It is mainly in limiting situations where the speed will be critical, eg, in music, information handling, control and some language processing.

Graphic primitives

The widest range of primitives here come from Acornsoft Logo. The special functions of this version include returning the distance of a turtle from any point on the screen, as well as the direction of travel needed to reach that point. In Acornsoft Logo and Logotron Logo the general approach to finding an equivalent of PLOT is to provide a SETNIB command which duplicates the facility. LSL Logo uses the subset FILL/NOFILL, and Open Logo uses PAINT. This is the only version that will fill a predrawn shape.

In all versions, drawing with the turtle showing is much slower than drawing with the turtle hidden. For some reason, Open Logo is particularly slow here.

Only the Open and Acornsoft versions have multiple turtles already available. Open Logo has four, while Acornsoft has up to 32, although this requires loading an extension from disc. Open Logo allows the user to keep track of each turtle in relation to the others. However, multiple turtles run slower than single turtles, and it should be possible to run a turtle in LSL or Logotron Logos to give the appearance of two or three separate turtles. This will require some programming expertise on the part of the user, or waiting until the sprite boards for these two Logos become available.

All the turtle 'fields' are roughly rectangular except for LSL Logo, which uses a square field and a larger turtle step (eg, FORWARD 50 in LSL Logo is equivalent to FORWARD 200 in the others).

Numeric primitives

Again a wide range from Acornsoft, some of which must be loaded from an extension. The OU version also has a wide range, but these are built in. Logotron, Acornsoft and the OU versions use infix notation as well as prefix notation. This means that

PR 23 + 54

will work as well as

PR SUM 23 54

LSL goes for the more traditional prefix notation, with the result that its arithmetic routines are very swift indeed. It is worth noting that Open Logo has some of its keywords rearranged so that, for example, PICK in Open Logo is a variation of RANDOM on the others. Not good for converting between Logos, but remember my comments about standardisation.

Control flow and conditional primitives

Again Acornsoft has the widest range, if not the best implementation. Following the Apple format, it uses THROW and CATCH to switch control during execution. It also includes a DOFOREVER loop. Although all the Logos in-

Bench Test No	Test tasks	Acornsoft	Logotron	LSL	Open
1	100 empty repeat loops	0.14	0.22	0.99	0.45
2	100 procedure calls	0.67	0.63	2.10	0.85
3	100 assignments of a 10-element list	3.10	0.84	2.20	2.52
4	100 assignments & 2 way parameter passing	4.20	1.60	2.80	3.49
5	100 sets of arithmetic	16.00	7.20	4.20	7.40
6	100 sets of trig	21.00	13.00	76.00*	9.90
7 Turtle shown	100 × 2 sets of forward backward	31.00	16.00	40.00	54.00
7 Turtle hidden	100 x 2 sets of forward backward	19.00	5.00	11.00	31.00
8 Turtle shown	100 × 4 sets of 90 deg left turns	33.00	26.00	40.00	45.00
8 Turtle hidden	100 x 4 sets of 90 deg left turns	22.00	13.00	11.00	7.50
9	100 printings of a 10-element list	15.40	4.40	6.00	5.60
10	100 reversals of a 10-element list	126.00	21.00	54.00	68.00

** ATN function not available – replaced by Logo procedures from LSL manual* — *Times in seconds*

Table 1. Ten benchtests demonstrate the performing speeds of the four Logos. Logotron averages out fastest

clude an IF . . . construction, LSL does not include infix notation here, so that for example:

PR :cat = []

must be translated to

PR EMPTY :cat

This again gives an increase in speed, but is not so flexible. Only Open Logo allows consideration of the >= or <= operation without resorting to AND or OR, and this is done with the new commands GEQ and LEQ, ie:

IF GEQ 7 3 [PRINT 7] [PRINT 3]

should print 7.

No outright winner or loser in this section.

Data and list processing primitives

As we have come to expect, Acornsoft has the lead here, too, with the largest available selection of commands and operations. Unfortunately it is in this area where its timings are worst. Before assessing whether there is a winner in this category, we need to consider some of the problems associated with the four Logos.

Open Logo and LSL Logo both use the JOIN operation to combine lists or words. This in itself is reasonable, and compares with the use of SENTENCE by the other two Logos. Unfortunately it is not possible to join a WORD to a LIST in LSL Logo or Open Logo, so that

PRINT JOIN [WE LUV] "KITTY

produces an error message which confirms this. Obviously, spokesmen for the various products will differ over which is the better approach, though I feel that the general solution is often the best. In talking about non standardisation, users should consider the Open Logo approach to naming things. Although

MAKE "Cleverland [Teaseside Heartlepool etc]

is acceptable,

PRINT :Cleverland

issues the error message

:Cleverland has no meaning

To print correctly we should use

PRINT Cleverland

You might think that this would cause confusion between procedures and named variables. The first time I defined "Cleverland as a variable, I tried to use it as a procedure by typing just

Cleverland

and was foiled by the message

Don't know what to do with system error 3. Press Break.

Feeling that this was so far from Logo philosophy, I intuitively extracted and refitted the Open Logo chips and tried again. This time I was rewarded with

Cleverland has no meaning

```
benchtest 1:
PRINT "S REPEAT 100 [] PRINT "E

benchtest 2:
TO BLOCK
END
PRINT "S REPEAT 100 [BLOCK] PRINT
      "E

benchtest 3:
TO BLOCK
MAKE "LIST [A B C D E F G H I J]
END
PRINT "S REPEAT 100 [BLOCK] PRINT
      "E

benchtest 4:
TO ENLIST :list
MAKE "newlist RELIST :list
END
TO RELIST :list
OUTPUT :LIST
END
PRINT "S REPEAT 100 [ENLIST [a b
      c d e f g h i j]] PRINT "E

benchtest 5:
TO BLOCK :size :inc
MAKE "size :size + :inc
MAKE "size :size - :inc
MAKE "size :size / 2
MAKE "size :size * 2
END
PRINT "S REPEAT 100 [BLOCK 50 10]
      PRINT "E

benchtest 6:
TO BLOCK :size
MAKE "trig (ATN ((SIN :size) /
      (COS :size)))
END
PRINT "S REPEAT 100 [BLOCK 50]
      PRINT "E

benchtest 7:
TO BLOCK :size
REPEAT 2 [FORWARD :size BACK :size]
END
PRINT "S REPEAT 100 [BLOCK 50]
      PRINT "E

benchtest 8:
TO BLOCK :size
REPEAT 4 [LEFT :size]
END
PRINT "S REPEAT 100 [SQUARE 90]
      PRINT "E

benchtest 9:
SETMODE 7
TO PRINTER :text :times
MAKE "c 0
REPEAT :times [MAKE "c :c + 1 PRINT
      (FPUT :c :text)]
END
PRINT "S PRINTER [a b c d e f g h
      i j] 100 PRINT "E

benchtest 10:
TO BLOCK
MAKE "newlist REVERSE [[A] [B] [C]
      [D] [E] [F] [G] [H] [I] [J]]
END
TO REVERSE :list
IF :list = [] [OUTPUT []]
OUTPUT SENTENCE REVERSE BF :list
      FIRST :list
END
PRINT "S REPEAT 100 [BLOCK] PRINT
      "E
```

Figure 1. The listing used to perform the 10 Logo benchtests

Apparently a subset of Open Logo must work with only one chip. Even so, this new approach to naming variables is a move away from whatever standard seemed to exist.

Talking in terms of non standard languages, LSL has its own problems because it uses commas to separate commands. I assume this is done for speed and ease of decoding. It seems strange to start with, but I expect it can be lived with.

Back to Acornsoft Logo, which contains such a wealth of extra list processing commands like ADDITEM, ERITEM and SETITEM that if it wasn't for its slowness of operation I'd be more than impressed. Logotron Logo and Acornsoft Logo come out joint top here.

Debugging primitives

As usual, Acornsoft is the most complete, using a particularly useful powerful tracing command. However, complete here does not mean best. The honours here go to LSL Logo with its easy to use debugging commands: SPY, TRACEP, TRACEV, REPORT and WALK.

Logotron has the smallest set of debugging procedures.

Procedures

Acornsoft and Logotron have the largest range of procedural primitives, followed by Open Logo and then LSL. Particularly amusing are the non-standard commands for reclaiming workspace: TIDY (Acornsoft), RECYCLE (Logotron) and GCOLL (Open Logo).

File handling primitives

There are two types of file handling primitives to consider. The first is the facility to save procedures to a filing system, the other is to save datafiles. All the versions can SAVE and LOAD single procedures, although Open Logo and Acornsoft Logo have commands to load and save screens currently available as primitives. All except LSL have some means of packaging the procedures so that the whole workspace can be saved as one filename. All versions appear to work with Econet, although Logotron recommends a modification to its SAVE primitive if an Econet is in use.

I personally prefer to *SPOOL text to the filing system, as this gives me maximum flexibility and also allows me to use either *Wordwise Plus* or the Acorn wordprocessor as a very powerful editor.

When it comes to data filing, the story is much reversed. The first prize for data handling must go to LSL, with a wide range of filing commands. Logotron is also in the running, but alas,

having used the wonderful data handling commands of Acornsoft Logo, we are unable to file any database made with them. This omission must be regarded as serious by teachers of IT and awareness courses. I wonder if Acornsoft consulted its CES team on this matter? After all, this is highly thought of by teachers of computing and advisers across the country.

Machine specific commands

However machine specific commands are presented, it is inevitable that they will try to mimic the Basic equivalents, down to the name if possible. Thus we lose the lovely ? operator for the dubious DEPOSIT or POKE and EXAMINE or PEEK. These commands are lacking on LSL's version, and despite my condemning them, it does seem a good idea to have some way of getting to terms with monitoring and controlling the environment. Logotron also lacks an ADVAL command (surely an important facility) and the real time clock of the other versions. This is sad because timing and handling time is very valuable to young children. Only Open Logo supports OSWORD calls, but this seems in keeping with its apparently academic aims. Acornsoft Logo wins this round, with Open Logo second.

Memory

All these versions of Logo make demands on memory, and all except LSL perform garbage collection on demand. Memory is generally measured in nodes, the number of which vary depending on the screen mode in use. One way of measuring memory usage is to use a standard (ha!) program which eats up memory, and to see how many times it will recur before running out of room.

A typical program might be:

```
TO SPACE :no
PRINT :no
SPACE :no + 1  (or SPACE ADD :no 1)
PRINT :no
END
```

which gives the results shown in table 2 when called in mode 7 with the command SPACE 0.

Added to which, a Fibonnacci sequence test by recursion failed at similarly low numbers on Acornsoft Logo. Open Logo wins here, and Logotron just beats LSL into second place because of the fatal out of space error in LSL.

SUPPLIERS AND PRICES

Acornsoft Logo

Available from Vector Marketing at £59.95.
Education class sets of 10 at £300.
Information from Bob Coates (Senior Education Advisor), Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN

Logotron Logo

Available from Logotronics at £59.95.
Education class sets of 10 at £300.
Information from Chris Roper, Logotronics, 5 Granby Street, Loughborough, Leics.

LSL Logo

Available to home users from LSL at £59.95.
(Education prices and delivery from Edward Arnold, 41 Bedford Square, London WC1B 3DQ.)
Information from Chris Squire, LSL, 316a Richmond Road, Twickenham, Middlesex.

Open Logo

Available from BBC Publications at £69.95.
Information from Software Editor, Software Department, BBC Publications, 35 Marylebone High Street, London W1M 4AA.

The editor

Each version has an editor, in effect an input buffer for entering and editing procedures. It takes the form of a blank text screen and behaves like a simple wordprocessor. However, all the Logos except LSL can create procedures outside their editors, using commands like TO or DEFINE.

Within the editors, each has its peculiarities. Acornsoft's seems to take up a large amount of memory permanently. Logotron's alters to fit the current mode. Open Logo's is prettiest, in a multicoloured mode 7 display. It also contains the most information in switchable HELP menus. LSL's, although having only very basic text editing commands, follows the format of editing in BBC Basic. The others are 'on screen editors', where all changes are implemented when the editor is left, although the screen alters as the editing is done.

Logo	Recurrences	Comments
LSL	644	Out of room is a fatal error
Open Logo	409	Recoverable
Logotron	324	Recoverable
Acornsoft	80	Editor uses large part of workspace

Table 2. Results of running a recursive memory-test program

Error messages

All the Logos support a set of error messages. Generally these are all very informative. I particularly liked Acornsoft's easily understandable messages, although Open Logo is impressive too.

I was sad to see that some of Logotron's messages had to be decoded: for example, with a fence in place Acornsoft Logo gave the message 'Turtle hit fence', LSL Logo said 'Can't FORWARD 500 Out of bounds', but Logotron said 'I don't like 500 as input'.

Extensions

All the four firms have planned or are currently offering extensions. Acornsoft's are already available on disc and included in the package. Utilities for screen dumping, multiple turtles, maths routines, and floor turtles are among the offerings here.

At the time of writing, Logotron is planning a sprite extension board at around £160 as well as other extensions on disc, which are expected to be as cheap as possible. This would certainly be welcome.

LSL has its own sprite board in the pipeline, and is taking feedback from users as to what extensions it should add, although procedure packaging is definitely on the cards. Hopefully it will not be long before these arrive.

Open Logo comes with a disc of utilities, which are very interesting to run. Also expected are distance learning material from the OU based on their Logo, and this in terms of adult education may prove a deciding factor in the battle of the Logo chips.

All versions have or expect to have, (or believe other companies will provide) extensions for the two common turtles:

1. The Jessop Turtles (All species)
2. The Valiant Turtle (Acornsoft Logo will drive four at once!)

and for their close relatives:

3. The Penman Plotter
4. The BBC buggy

Conclusions

As you can see, there is no outright overall winner in the battle of the turtles. It depends on your own interests and on which facilities you need. Let's consider my likes and dislikes across the group.

Open Logo

I liked its maths routines, its editor, its

documentation, its extension disc and the disc copy for second processor use. I disliked its speed for list processing and graphics, the twin chip system, its way of naming variables (this is personal preference) and its lack of datafile handling.

Conclusion: probably most useful for older users, but I look forward to probable OU teaching materials.

LSL Logo

I liked its speed, its debugging primitives, the datafile handling, the single chip system and the manual. I disliked the lack of infix notation, the lack of ATN function, commands separated by commas (again personal preference), the editor and the fatal 'out of room' problem.

Conclusion: I became more impressed with this version as I used it. Most likely to have success with children in the middle school range.

Logotron Logo

I liked its overall speed, the editor, its list processing, the single chip system, its filing and the manual. I disliked its method of changing modes, the system crashing on using *COMPACT, *COPY or *FORMAT, the lack of ADVAL command, debugging commands and time clock.

Conclusion: for general use, this Logo covers a wide range. It is generally compatible with Spectrum, Atari and Apple Logos and hence should appeal to many users. However, I would like to see an extension disc curing some of the problems. The sprite board should also prove interesting.

Acornsoft Logo

I liked the wealth of commands, the extension disc, its documentation, the graphics generally and particularly the multiple turtles (which can change shape). I disliked its slowness, its twin chips, the space used by the editor, and the lack of datafiling commands.

Conclusion: despite its slowness, this version has much to offer, particularly in the area of cheap graphics, eg, the multiple turtles, etc. Users need to beware of its problems with recursion, which are partly caused by the space used by the editor. Acorn is making the language available for the Electron, and users needing compatibility should think about this version. I would probably place this with younger users, and include a floor turtle in the package.

See page 79 for Acorn User's special offer on the Valiant Turtle

Final considerations

In many ways one version of Logo would have forced the issue of which one to buy. Certainly Acornsoft's is not up to the standard of BBC Basic, but then nor are any of the others. If you want to buy a Logo system, you need also to think in terms of the end cost. An expansion ROM board may be needed for the two-chip systems, while the single chip versions may need expensive sprite boards to give multiple turtles.

Schools wishing to enter the realm of Logo should almost certainly buy either Acornsoft or Logotron versions because of the low prices currently available. It might be wisest for home users to check with their children's schools before buying their own copy.

MICRO MEDIA-MICRO MEDIA

SUPPLIES SAVE ££££

FLOPPY DISCS

NASHUA 5 YEAR WARRANTY

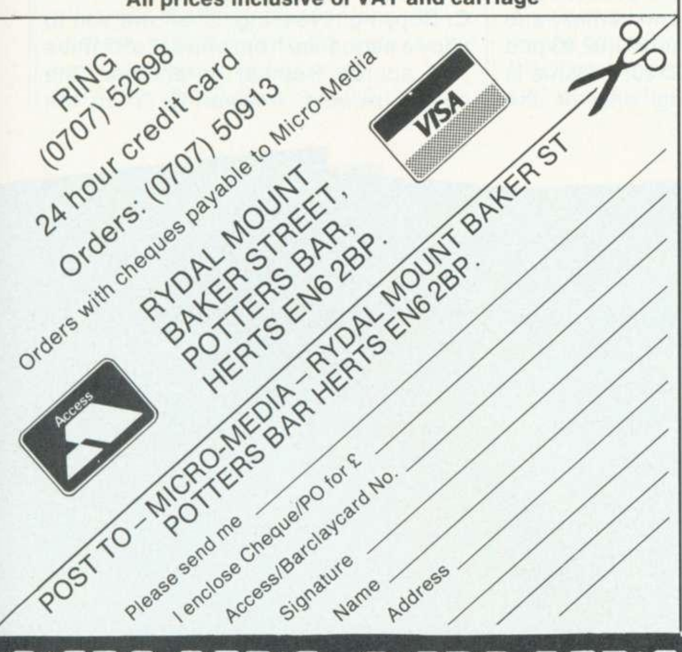
All prices **inclusive** of VAT and carriage.

5¼" TPI	*1-2 boxes*	*3+boxes*
SS/SD 48	**13.50**	**12.75**
SS/DD 48	**15.85**	**13.85**
DS/DD 48	**18.95**	**16.75**
SS/DD 96	**20.90**	**17.90**
DS/DD 96	**24.80**	**21.50**

3M Lifetime guarantee

5¼" TPI	*1-2 boxes*	*3+boxes*
SS/DD 48	**16.30**	**14.00**
DS/DD 48	**21.40**	**18.70**
SS/DD 96	**24.25**	**21.00**
DS/DD 96	**28.00**	**24.30**
Disc Storage	*1-2 boxes*	*3+ boxes*
10 × 5¼ See10	**3.50**	**3.00**
30 × 5¼ Rexel	**8.00**	**7.50**
90 × 5¼ Lock Lid	**17.80**	—
Ribbons	*per ribbon*	*per box*
Brother HR15 M/S	**5.60**	**5.10 × 6**
Canon PW 1080	**7.40**	**6.75 × 6**
Epson FX/MX 80	**4.85**	**4.00 × 5**
Epson FX/MX 100	**6.50**	**5.25 × 3**
Juki 6100	**4.20**	**3.50 × 6**
Kaga KP 810	**7.40**	**6.75 × 6**
Oki Micro 80/82	**2.35**	**1.90 × 12**
Walters VM 2000	**4.65**	**4.15 × 4**
Continuous Labels	*1000*	*3000+*
89 × 36 – 1000	**6.00**	**4.50**
Listing Paper		*per box*
11" × 9½" 500		**4.50**
11" × 9½" 2000		**17.00**
(Exact A4)		
70 GSM 2000		**22.50**
100 GSM 1000		**25.00**

All prices inclusive of VAT and carriage







GRIFFEN COMPUTERS

TEL 0279 812295

8 RAINSFORD ROAD, STANSTED, ESSEX CM24 8DU

ROM SOFTWARE

SPECIAL OFFER

WORDWISE-PLUS only £48.00 (c)

EXMON II B/E	£26.25 (b)
TOOLKIT B/E	£24.65 (b)
MUROM	£26.25 (b)
SPELLCHECK II 40/80	£28.60 (b)
SLEUTH	£26.25 (b)
WORDWISE	£36.00 (c)
PRINTMASTER (EPSON)	£27.50 (b)
PRINTMASTER (STAR)	£27.50 (b)
CARETAKER	£27.50 (b)
GRAPHICS	£27.50 (b)
DISC DOCTOR	£27.50 (b)
CLARES BROM	£31.50 (b)
ISO-PASCAL	£62.00 (c)
LOGO	£62.00 (c)
VIEW	£48.00 (b)
ADE (40/80)	£54.00 (b)
SPY II	£27.50 (b)
ADDCOMM	£26.75 (b)
ULTRACALC II	£71.50 (b)

DISC SOFTWARE

SPECIAL OFFER

PROXIMA BEEB-TEXT only £14.00 (b)

A disc based multi-font text display program. Features infinitely variable width and height of individual words. Variable italics, shadow and outlining are supported. Possibly the best value titling package for the Beeb!

SPELLCHECK (WORDWISE) 40/80	£16.20 (b)
SPELLCHECK (VIEW) 40/80	£16.20 (b)
MASTERFILE II 40/80	£17.90 (b)
CLARES BETABASE 40/80	£23.90 (b)
CLARES REPLICA II 40/80	£11.90 (b)

DISCS & INTERFACES

ACORN DNFS	£99.95 (b)
UDM DDFS (Version 2)	£89.95 (b)
OPUS DDOS	£99.95 (c)
40 TR S/S	£14.95 (b)
40 TR D/S	£17.25 (b)
80 TR S/S	£18.90 (b)
80 TR D/S	£20.90 (b)
27128 MITSUBISHI UV EPROMS 250nS	£10.50 (a)

All prices include V.A.T. @ 15% **B/E – BBC/Electron**

Postage rates – (a) 50p (b) 75p (c) £1.25



CARTOONS BY COMPUTER

Create 'film' sequences with Joe Faith's Animator program – then enter your cartoon in our competition

THIS program allows you to generate film sequences of a human figure. It is based on a frame system: 650 frames can be held in memory and replayed at speeds up to 10 frames a second.

On running the program you are prompted to input the screen mode you want to run it in. Select either mode 1 (for around 250 frames) or mode 5 (for around 650 frames of a lower resolution).

You are then presented with a menu. Press Escape at any time to return to this menu (pressing Escape at the menu exits the program).

Menu options

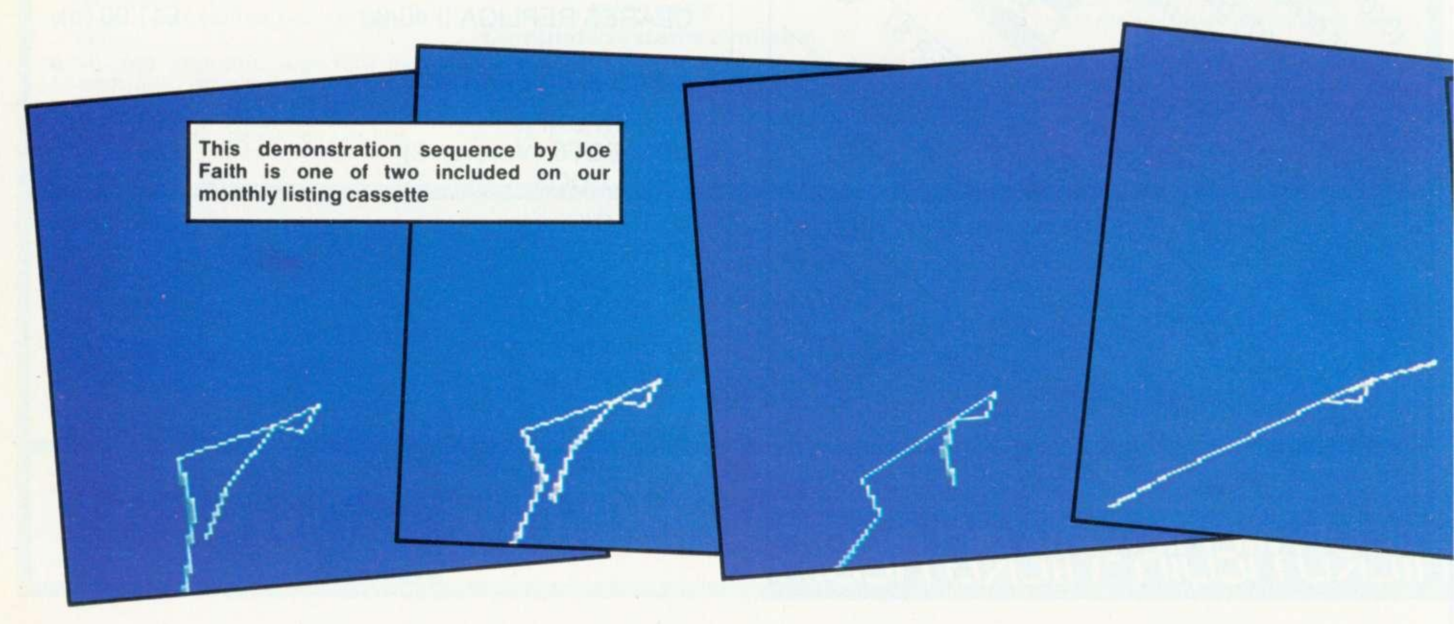
1 Show film This prompts for a delay between the frames, in centiseconds. (The computer takes 10cs to simply display every frame, so take this into account.) Then you are asked whether you want to show the film in single steps, ie, waiting for you to press a key between each frame. After that it asks if you want to see the entire film: entering 'N' will allow you to enter the first and last frames to be seen. Pressing Return on its own in answer to the delay prompt will show the entire film at the fastest possible speed, with no need to enter the other parameters.

2 Edit film This prompts for the frame you want to edit, and displays the number of frames currently in memory. If you choose a frame number higher than the present top, all the frames between the old top and your choice will be made equal to the present top, ie, if there are 90 frames in memory and you choose frame 104 then 91,92,93 and 94 will be made equal to 90. A frame is edited by manipulating one of the limbs. Press 'L' and then the number corresponding to the part of the body in figure 1. Move the point with the cursor keys, using Shift to accelerate the movement.

From edit mode a number of other features can be selected by pressing the following keys:

I: 'Inbetweening'. This powerful command takes the hassle out of creating smooth sequences. For instance, to create a sequence where the figure goes from having outstretched hands in frame 10 to hands akimbo at 20, set 10 and 20 how you want them; press 'I'; enter 11 for the first frame (since it is the first you want changed) and 20 for the last.

C: Copying. Pressing 'C' allows you to copy a sequence from one set of frames (the source frames) to another (the object frames). Answering 'Y' to the



This demonstration sequence by Joe Faith is one of two included on our monthly listing cassette

question 'Reverse?' will reverse the order of the object frames – useful for making the figure repeat a sequence backwards.
S: 'Saming'. This command simply prompts for a frame number to make the present frame equal to.
3 Load new film Self-explanatory.
4 Save present film Self-explanatory.

The display order table

The 24 bytes making up any frame are stored in memory in a certain order. They are also a quarter of the actual screen co-ordinates to be plotted, to allow for one byte per co-ordinate.

The display order table shows in which order the 12 x,y pairs should be plotted: if 100 precedes any pair, it indicates the cursor should be moved, not drawn, to that co-ordinate. The values are offsets from the first byte, so to draw a man:

1. The address of the first byte is found.
2. The first value from the display order is read.
3. If it is 100 move the cursor and get the next value.
4. Use this as an offset to read the next X co-ordinate and times it by four.
5. Repeat with the Y co-ordinate.
6. If all the points have been plotted/drawn END, otherwise go back to 2.

General variables

F% = first frame for any effect.
L% = last frame.
Q%,W% = general FOR . . . NEXT loop counters.

Main procedures

PROCset_up Assembles routine to print man. Called by first setting !&84 to address of first byte in the data for the frame and then calling 'man'.
300-320: sets loop counter to 0.
330-380: increments loop counter and performs OSWRCH 25 (plot).
390-510: if next number in display order table is 100 send a 4 (move) instead of 5 (draw) to OSWRCH.
510-530: get offset from display order table into Y and use it to load A with the next x co-ordinate to be sent.
540-660: multiplies it by four to get the real value and stores it in &8E (high) and &8D (low).
670-690: sends them to OSWRCH.
700-870: increments Y and repeats for the y co-ordinate.
880-910: If that's all the co-ordinates, finish.

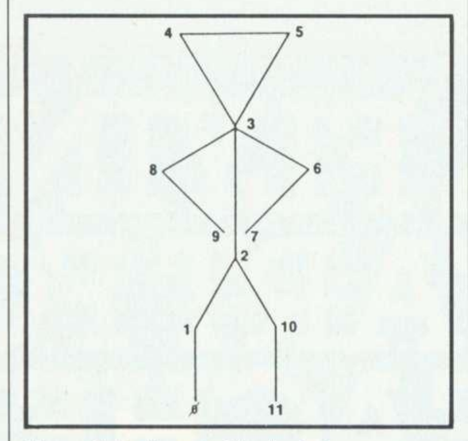
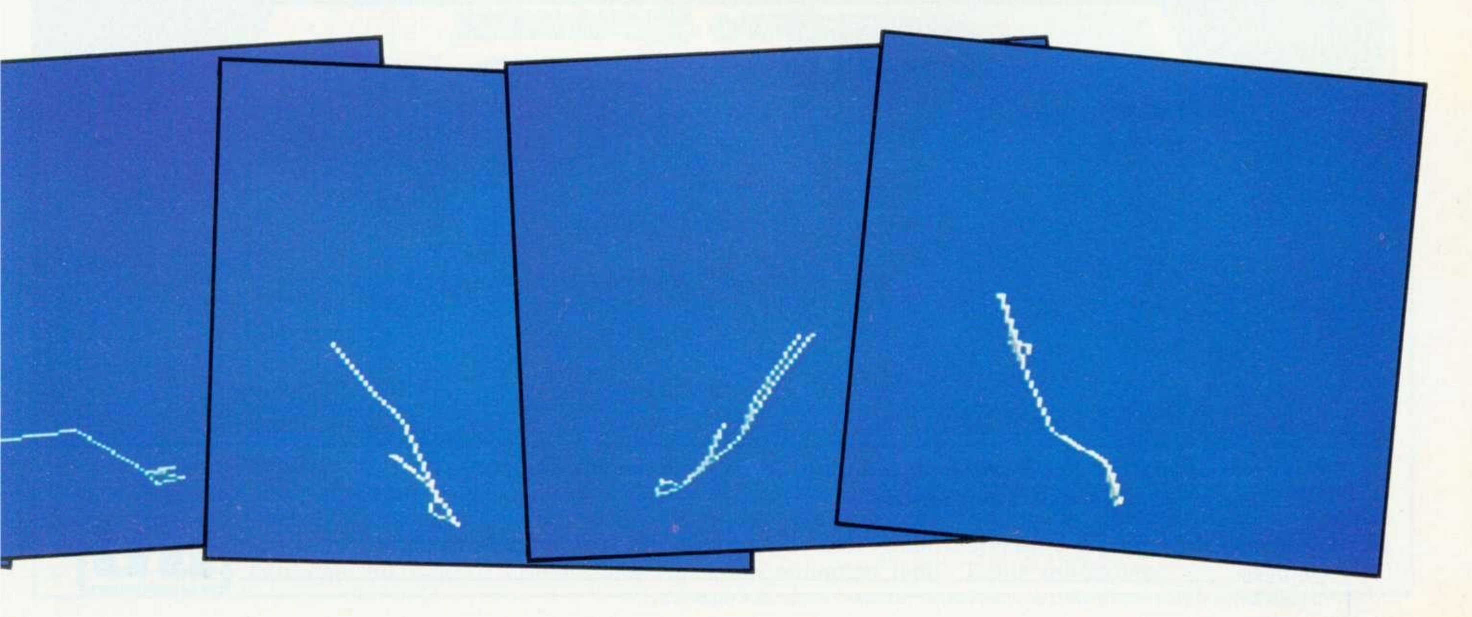


Figure 1. Each part of the body has a different number

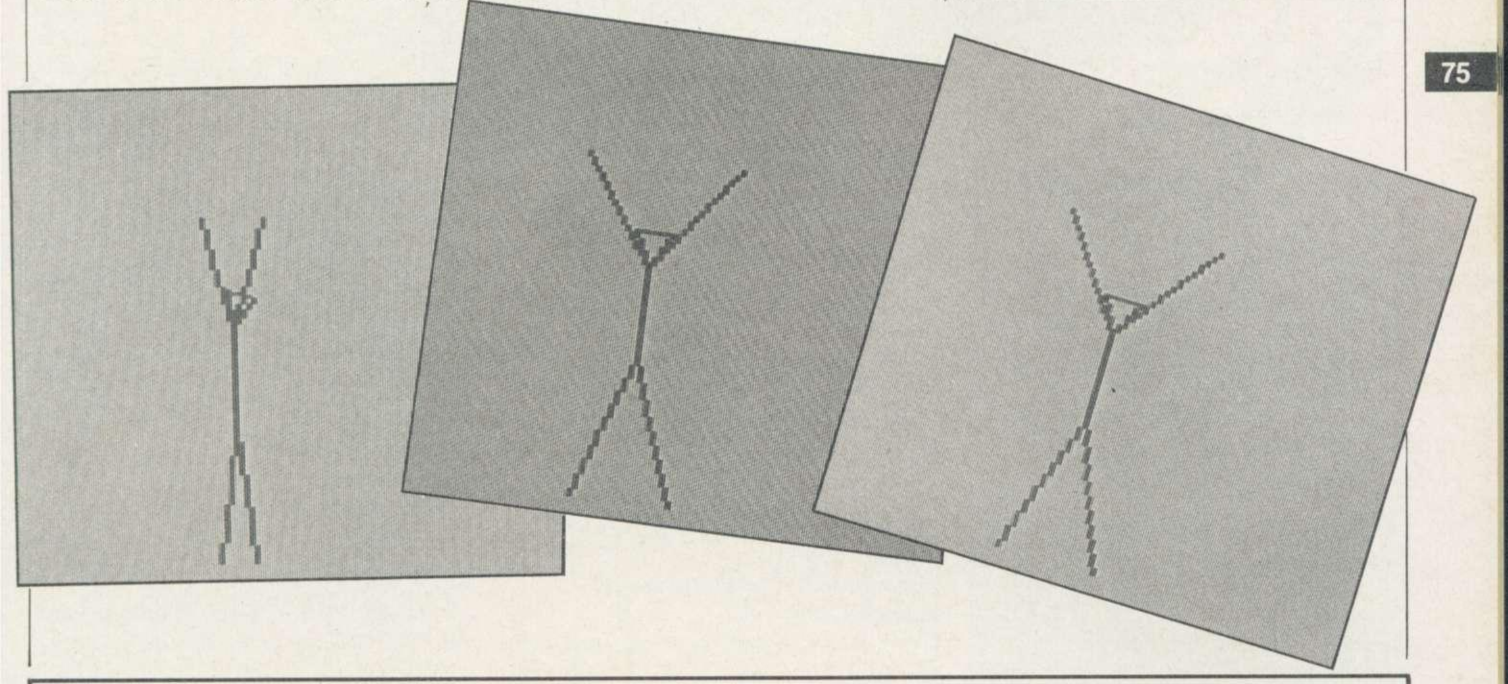
PROCset_var Sets the main variables:
B% (Base): address of first byte of first frame, so B% + X*24 will give the address of the first byte of frame X.
E% (End): address of first byte of last frame.
N%(Number): number of frames in use.

This procedure also sets up the display order table at &71 on, and the data for the 'standard' man in the first frame.
PROCmenu Displays menu.
G%: used when Escape is pressed. If it equals 0 then the program was exited at the menu and it is allowed to end.
PROCshow Shows film.
C%: counter displayed on screen.
F%: first frame to be displayed.
L%: last frame to be displayed.
S%: 2 – film should be shown at fastest possible rate.
1 – single step.
0 – delay loop should come in.
D%: length of delay.
J%: records colour of man currently displayed.
PROCedit Straight away the main loop is entered, colours are returned to default and screen is cleared.
M%: number of frame being edited.
P%: starting address of present frame.
1370: if extra frames are wanted the new ones are 'topped up', filled in with copies of present frame.
1380: S% – current limb being moved.
O% – address of previous frame, for 'shadow'.
1400-1410: X%,Y% – address of co-ordinates.
x%,y% – values of co-ordinates.
1420-1430: draw man and shadow.
1460: A% – how fast limb moves, 4 if Shift is pressed.
1470-1550: moves point.
1560-1600: character pressed is ANDed with &DF to get the upper case value and appropriate action is taken.
1610: repeats until 'F' is typed; a new frame is wanted.
PROCinter Performs 'inbetweening', smoothing out action.
I%: number of frames to be changed.
1800: Q% counts through the bytes making up the frames.
1810: D becomes the difference between points on successive frames.
C%: counter.
1820-1850: W% goes through the frames to be changed. C% is incre-



mented and the point to be changed becomes equal to the point on the starting frame + (difference*counter).
PROCsave A$ holds filename,X% the channel number.
PROCload Ditto.
PROCcopy F% and L% equal the end frames of the source sequence,J% and K% the object sequence.
2230: if new frames are being created, N% and E% are suitably reset.
2260: if the object code is to be reversed, the counter C% is set to −24, otherwise 24, and the starting frame is made equal to the final one.
2270:Q% counts up to the number of frames in the sequences.
2280-2310: W% goes through the points and copies them over. J%, the object frame pointer, is incremented and F% is changed suitably.
PROCsame This asks for the frame to be made equal to and then copies it into P% onwards.
PROClimb Asks for the new limb to be moved.
FNcaps Returns the uppercase ASCII equivalent of A$.

The Animator listing is on yellow pages 98–100. You'll also find two demonstration sequences on the monthly cassette







Competition

WIN A PRISM 1000 MODEM

Three prizes for the best 'film' sequence designed with Animator

IF YOU fancy yourself as an 'inbetweenie' why not enter our competition to produce the best animated 'film' using Joe Faith's *Animator* program? *Acorn User* in conjunction with Micronet 800 are offering three prizes of Prism 1000 modems and communications ROMs – each package is worth £89.

The best three entries, in the opinion of the Editor, will each win a modem, and the overall winner will also receive a £16 voucher, that can be offset against the cost of subscribing to Micronet 800.

The winning entries will appear in *Acorn User* and on Micronet 800.

Micronet users will be able to download both the *Animator* program and two demonstration sequences after April 25th.

So send in your entries to Animation, Acorn User, 68 Long Acre, London WC2E 9JH, to arrive no later than Friday June 7th. Each animated film sequence must be provided on cassette or disc, and you should include a brief letter describing your entry – also don't forget to supply your name, address and a daytime telephone number if possible.

Your name and address should also be marked on your disc or cassette.

Acorn User cannot undertake to return any submissions or enter into correspondence. The decision of the Editor will be final.

Fully automatic modem at a fiendishly low price of

£49.95

plus VAT + p & p

The DEMON modem



"... simplicity itself... it performs as well as – if not better than – any I have used... all-in – exceptional value for money."
Acorn User, April 1985

DEVILISHLY CLEVER FEATURES

* Auto Dial
* Auto Redial
* Auto Answer
* Full and half duplex
* European and U.S.A. standards
* Complete with Power Supply, Leads and Manual
* Full Baud rates.

WHY IS IT SO LOW IN PRICE?

The answer is simple, we've taken existing technology and components, no R + D costs and combined them with modern manufacturing and quality control techniques to produce an inexpensive but state of the art product.

DOES IT DO EVERYTHING WE SAY?

We've bought BT approved components. We are also giving a 6 month 'no quibble' guarantee. In the unlikely event that you have a problem, simply let us know and we'll send you another machine or refund your money in full.

EASY TO USE?

You don't need to know anything about baud rates or protocol or 'handshaking' simply plug it in and talk to the world.



Demon Limited
20 Orange Street
London WC2H 7ED.

FEATURES OF THE MODEM

Auto Answer

The Demon answers, then uploads or downloads data into your micro and printer just like a telex.

Auto Baud Rate Scan

When receiving, the modem can scan the incoming data and select the correct baud rate to receive.

Full and Half Duplex

One or two way simultaneous transmission.

Full U.K., European and U.S.A. standards

V21 and 23, CCITT, Bell 103 and 202.

Baud Rates

300/300, 1200/75 75/1200 1200/1200 (Half Duplex).
Suitable for Micronet, Prestel, etc.

Easy to Use

Complete with all leads, power supply, operating and reference manuals.
Fits all RS 232/423 interfaces (state machine).

Software Features on ROM (BBC only)

Electron, Amstrad, Commodore, Dragon, Sinclair and IBM PC to follow.

Auto Dial

Bulletin Board Facility

Start your own or contact all information boards throughout the world.

PSS

Packet Switching Service lets you dial world-wide databases for the cost of a local call.

Printer Routines

Allows use of printer while on line, recording data in and out.

Reliable File Transmission

Popular error correct protocol means you can send, store and receive files with no transmission errors.

Software Commands

*Host enables you or your friends to dial and upload and download your programs or data from other modems
*Timeout allows you to set time limits to callers of your micro.
*Prestel and *Terminal allow Glass Teletype and Prestel terminal facilities.
All software commands and full control of baud rates can be incorporated into your own software.

DEMON ADAPTOR

£3.50 + VAT & p & p



Two way split adaptor allows you to plug your phone & modem into the same socket.

HELP LINES

Technical enquiries 01-930 1612
Credit Card Orders 01-930 3619
Dealer enquiries 01-930 3873

PERSONAL CALLERS VERY WELCOME

Visit our premises at 20 Orange St, London WC2. You can save our £3.00 delivery charge by calling in – you'll be welcome from 10.00 am till 4.00 pm, Monday to Friday.

OFFICIAL ORDERS

We accept orders from all government bodies, schools, universities, libraries, armed forces etc. We despatch within 28 days of an official purchase order. If you can't raise a cheque without an invoice just post or telephone your order and we'll send you a pro-forma by return.

To Demon Limited, 20 Orange Street, London WC2H 7ED

Please send me:
______ (Qnty) Demon Modems at £61 (includes VAT and p & p)
State Machine ______
______ (Qnty) Demon BBC Rom's at £24 (includes VAT and p & p)
______ (Qnty) Demon Dial Disks at £4.95 (includes VAT and p & p)
State 40 ______ or 80 ______ track.
______ (Qnty) Demon Adaptors at £4.95 (includes VAT and p & p)

I enclose cheque to the value of £
Or debit my Access/Visa/Amex/Diners.
Card no. ______
Signature ______
Name ______
Address ______
______
Postcode ______ (Please print)

CAPITAL ROUTINES

Change lower case letters into upper with Peter Gaunt

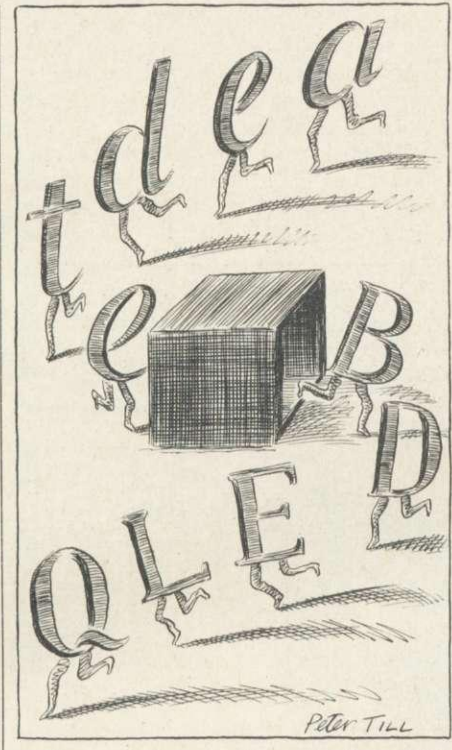
ONE OF THE annoying little problems with the BBC micro and most others is that upper and lower case letters have different ASCII codes. For example, A has the code 65 while a has code 97. This can cause all kinds of problems with things as diverse as single key selection from menus to sort routines. This article describes two assembler routines, one of which will check each key press, changing all lower case letters to upper case before entering the character into the keyboard buffer; the other will check rapidly through a Basic string changing all lower case letters to upper case.

At first sight there may appear to be no problem using INPUT, GET or INKEY to detect only upper case letters, since the Beeb's operating system includes an OSBYTE (*FX) routine to turn Caps Lock on or off. If you enter *FX202,32 into the computer the Caps Lock light will come on. Similarly *FX202,16 will turn on the Shift Lock. Surely this should solve the problem – all the programmer has to do is ensure that there is a *FX202,32 before each INPUT or GET? Unfortunately this is not the case. True, the *FX command will turn on the Caps Lock, but then the program will sit there waiting for something to be typed in. If, before typing anything, the user inadvertently presses the Caps Lock key, Caps Lock is turned off again!

All sorts of statements can be constructed in Basic to get around this problem when using GET or INKEY but none of them is completely satisfactory, and I know of no way in which INPUT can be made to accept only upper case using Basic. For this reason I have put together two easy-to-use routines which assemble short pieces of machine code to sit in spare memory and take care of all this.

Listing 1 is a routine which intercepts any character about to enter the keyboard buffer. It checks to see if that character is a lower case letter and if it is changes it into its upper case equivalent. It can be turned on or off using *CODE or *FX136.

ILLUSTRATION BY PETER TILL



Many of the routines in the BBC micro's operating system are indirected through vectors. For example, when you issue an OSBYTE command the operating system jumps to a routine whose address is held in RAM at addresses &20A and &20B. So the user can direct the program to some new code simply by changing the contents of these vectoring addresses.

Listing 1 uses two of these vectors to check all characters entered at the keyboard. At addresses &22A and &22B is the address of the routine which the operating system uses to insert a character into a buffer. It is known as the insert vector. The routine in listing 1 can change the contents of this vector to point to some new code which checks each character just before it is inserted into the keyboard buffer. If it's lower case then it's changed to upper case before the new code jumps to the routine in the operating system the insert vector originally pointed to.

The other vector used by listing 1 is the user vector at &200. The vector is used whenever *CODE or *FX136 is issued and normally it simply gives a bad command error. The listing changes the contents of this vector to point to the command subroutine in the listing, in effect adding a new command to the operating system. The command subroutine looks at the contents of the X register and decides whether to turn the lower-case checking on or off. If X = 1 (after *CODE1 or *FX136,1) then the insert vector is set to point to the checking code, while if X=0 (*CODE0 or *FX136,0) the insert vector is set to its default value.

The routine is not intended to be used as an assembly listing within a program, since this would use up too much memory. To use the routine, type in the listing and save it before you run it. Run the program and when it runs without error messages, save the assembled code with *SAVE CAPS A00+85. If you're using a cassette-based micro then you should change the value of 'code' in the listing to &C00 and when you *SAVE the program *SAVE CAPS C00+85. Whenever you want to use the code you should *RUN CAPS (or from disc simply *CAPS), to load and initialise the code. Then, if you want all input from the keyboard to be in upper case letters, use *CODE1 or *FX136,1. The computer will operate exactly as if the Caps Lock is on regardless of whether it actually is. To turn the effect off use *CODE0 or *FX136,0. Pressing Break will disable the code and it will have to be reloaded.

Listing 2 is a routine which will act on a Basic string and change any lower case letters in it to upper case. I wrote it because I was having problems with a sort routine. If you run a sort routine on a list of words which are in a mixture of lower and upper case letters then you'll find that all the words which begin with lower case letters are at the end of the list. This is because the lower case letters have higher ASCII codes than the upper case ones. To get around this problem I wrote a Basic function to check through each string for lower

case letters. This worked fine but slowed the sorting down too much – so I wrote this piece of code to do the checking, using the parameter passing ability of Basic's CALL to tell the routine which string to act on. The routine will check a string of 255 characters, the maximum length which Basic strings can be, in around one-hundredth of a second. The addresses used by this routine don't conflict with those used by listing 1 so both routines can be in memory at the same time.

When one or more parameters are passed to a machine code routine using CALL, a parameter block is set up at &600 giving information about the variables which are passed. In the case of a string the parameter block contains the address at which Basic has stored the information about the string. Listing 2 uses this information to find the address of the end of the string and then works down the string from the end; each time it finds a lower case letter it changes it to upper case.

Type in listing 2 and save it before running it. Run it and, when prompted, enter a string containing lower case letters. The program will then convert all lower case letters to upper case. The altered string is printed out to confirm this has been done. Simple, isn't it?

PROCupper_case can be added to any program you like. At the beginning of the program you must call PROCupper_case to assemble the code. Any time you want to change a string into capitals simply use CALL upper_case,X$ (or whatever the name is).

If you like, you can just save the assembled code as you did with listing 1. To do this load listing 2 and enter PROCupper_case to assemble the code; then save the code with *SAVE UPPER A90+30. If you do this, to use the code in a program you must put a line at its start reading *LOAD UPPER followed by another reading upper_case=&A90. You can then use it exactly as if you had PROCupper_case incorporated in the program.

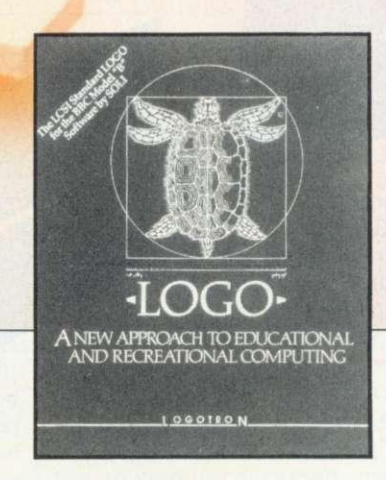
The parameter block which is set up when using CALL also contains information about the type of parameters passed, that is whether string or numeric variables. This information can be used to check that the sort of parameter expected has indeed been passed. In order to reduce the length of the code this facility is not used by listing 2. If you pass the wrong type of parameter, by for instance using CALL upper_case,A%, then your program may crash or hang up. Beware!

Listing 3 is an example of how to use the code as part of a sort routine, asking you to enter 10 words which it then sorts into order. You should also type in PROCupper_case from listing 2 or *LOAD UPPER if you saved the assembled code. Make sure that some of the words you enter are in lower case and some are in upper case. If you leave out line 270 you'll find that the list of sorted words has all the lower case words at the end whereas if you include this line the words will all be sorted, paying no attention to the case of the letters. If you look at listing 3 you'll see that before comparing two words in the list the words are first put into temporary strings, w1$ and w2$. This is necessary to prevent the machine code routine from acting on the actual words in the list; if it were allowed to do this it would leave them all in upper case.

Peter Gaunt's listings to change lower case letters to upper case are on yellow pages 101-103.

SAVE ON TURTLES

VALIANT TURTLE £169.95* SAVE £30
TURTLE plus LOGO £199.95* SAVE £70
***includes VAT and post**



Your chance to exploit the possibilities of robotics and Logo – and save money

THE Valiant Turtle is a robot which can be controlled from the BBC micro's keyboard. It obeys Logo commands just like a screen turtle. There are no wires connected to the Turtle as it is controlled by an infra-red beam similar to those used for TV sets. The beam comes from a small box which plugs into the Beeb's RS423 socket. Tell it to move, turn – or even draw using its built-in pen – and it will! A great way to learn about robotics and programming – and fantastic fun.

To find out more about Logo, see Joe Telford's articles in this and April's issues. See last November's *AU* for a review of the Valiant Turtle.

Just fill in the form below and send your cheque made payable to Valiant Designs Ltd for the required amount to: Acorn User Turtle Offer, 68 Long Acre, London WC2E 9JH. The offer closes on July 1, 1985 and is only valid in the UK.

Please send me:

.... Valiant Turtle(s) at £169.95 each*. I enclose £......................

.... Turtle plus Logo packs at £199.95 each*. I enclose £......................

Total cheque value (payable to Valiant Designs Ltd) £......................

**includes VAT and postage*

Name ....

Address ....

.... Post code ....

Send this form with your remittance to Acorn User Turtle Offer, 68 Long Acre, London WC2E 9JH

Drives Apart-High Capacity Low Cost Disk Drives for QL and BBC Micro`s

With so many disk drives on offer, choosing can be a somewhat confusing and difficult exercise. On the surface they all seem to perform and look the same. Of course that's not the case and what it all boils down to at the end of the day is the data storage reliability and the number of bytes of disk storage you get for every £ spent.

Take the new range of professional 3.5 inch and 5.25 inch disk drive systems from Micro P. They are designed for use with QL and BBC Micros, housed in a rugged metal case, essential for screening from stray electrical fields which can reduce data storage reliability, and have their own power supply so as not to drain precious power from your micro needed for other less sufficient peripherals.

Most important of all you get in excess of 452 bytes of disk storage per £ for the QL and 251 bytes for the BBC.

A further added bonus of the Micro P drives is that they are available in the new 3.5 inch format which is undoubtedly set to become the standard.

Not only do 3.5 inch drives take minimum space, quite often at a premium for the micro user, but they also use easily transportable pocket sized media and are automatically protected from dust and finger prints.

Micro P are one of Europe's largest independant importers of peripherals and combined with their in-house R&D and manufacturing facility you have the assurance of professional after sales back-up. Combined with this you have peace of mind that the drive is manufactured by the largest company in Japan, a name synonymous with quality and reliability.

Micro P BBC with PSU
5.25" 400K DS40/80T
DRIVE 1 £159*
DRIVE 2 £139*

Micro P BBC with PSU
3.5" 400K DS40/80T
DRIVE 1 £159*
DRIVE 2 £139*

Micro P QL with PSU
3.5" 720K DS 80T
DRIVE 1 £159*
DRIVE 2 £139*

Micro P QL DOUBLE DENSITY DISK INTERFACE
For QL £99*

Micro P — QL Disk Drive System

The custom designed interface card, which can be purchased, separately, plugs directly into the QL's expansion port and can support up to 4 floppy disk drives giving a total formatted capacity of 2.88 MBytes of disk storage. It also provides a range of resident commands. Complete systems come with a free utilities disk. With its superb file facilities, disk & memory editor, this is a must for any serious QL user. The I/F card can also be configured to emulate microdrives meaning that once data and progs. have been backed up to disk there is no need to re-configure. Utilising the disk drives enhances the speed of use, e.g. Quill takes only 6 seconds to load.

Micro P BBC Disk Drive System

The drives, available in a choice of 3.5 inch or 5.25 inch, are based on the standard multibus, same as the QL, and connect directly to the BBC Micro fitted with the standard disk drive interface

To: Keyaki, Enterprise House, 44 Terrace Road, Walton-on-Thames Surrey KT12 2SD

Please supply the following:

.......off QL D/Disk Drive Interface @ £113.85........
.......off QL Drive 1 – 3.5"+PSU @ £182.85........
.......off QL Drive 2 – 3.5" @ £159.85........
.......off BBC Drive 1 – 3.5"+PSU @ £182.85........
.......off BBC Drive 1 – 3.5" @ £159.85........
.......off BBC Drive 1 – 5.25"+PSU @ £182.85........
.......off BBC Drive 2 – 5.25" @ £159.85........

Name..
Address..
..Postcode....................
Telephone..
Tick box for details of Instant Credit up to £1000
I enclose my cheque no. ....for £..........
Please charge my Access/Barclaycard No.

Signature: ....

*Prices do not include VAT



Telephone Credit Card Orders welcome.
Personal Collection welcome.
Open Monday to Saturday – 9.00 a.m. until 5.30 p.m.

THE KEYAKI 100% GUARANTEE
- *Full 1 yr. no quibble warranty*
- *14 day Money Back Guarantee*
- *Delivery within 7 days subject to availability.*

£1000 instant credit, writtent details on request.



Enterprise House 44 Terrace Road, Walton-on-Thames, Surrey. KT12 2SD Tel: 09322 42777

TRADE & EDUCATIONAL ENQUIRIES WELCOME

A CHANGE OF MODE

Tristram Mabbs adapts his colours by interrupts program to give you more than one mode on screen

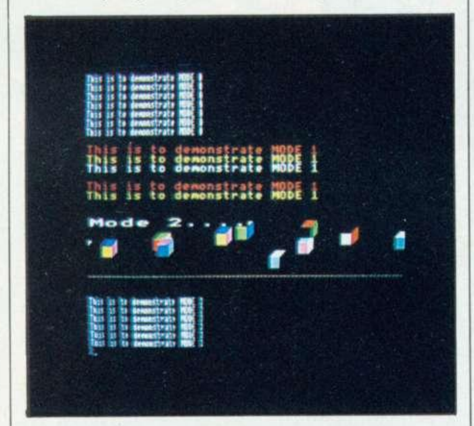
LAST month's article covered the use of interrupts to change colours during a screen scan, allowing multiple colours to be used, even if only a two colour mode has been selected. This month I'll describe an adaptation of this routine to provide mode changes at defined intervals on the screen.

Mode changing interrupts are a more specialised use of the Display List Interrupt technique than the simple colour changing routines. This is because you will need to provide your own plotting and drawing routines, or use *FX calls, to convince the VDU driver that parts of the screen have different numbers of colours.

As for last month's routines, the video ULA is accessed directly by the interrupt software, so a brief description of the mode control register is required. This is located at &FE20 and controls various functions. The top three bits determine the cursor width and so need no detailed explanation here. Bit one selects teletext output (using the SAA5050 CGEN) and is therefore ignored, as assorted hardware interlocks generally prevent mode 7 being mixed with the other modes.

Bit zero selects which of the two flashing colours for any given flashing colour is currently being displayed. This is also irrelevant for the routine except in as much as it necessitates the deselection of flashing colours unless the mode displayed at the top of the screen is the same as the mode selected when PROCsetdlis was called. If this is not the case, the top section of the screen will flicker at the rate determined by *FX9 and *FX10 as the entire ULA control register has to be rewritten to change bit zero. The control register is write only. The other way of preventing this flickering is to use *FX154,x where x is the value listed below for the mode at the top of the screen. For instance, if the top mode is mode 0, use *FX154,156 (as 156 = &9C).

Next, bits two and three determine how many characters (note: not bytes) are displayed per line. They form a two bit number with zero representing 10 characters per line; 1 represents 20, 2 is 40 and 3 is 80.



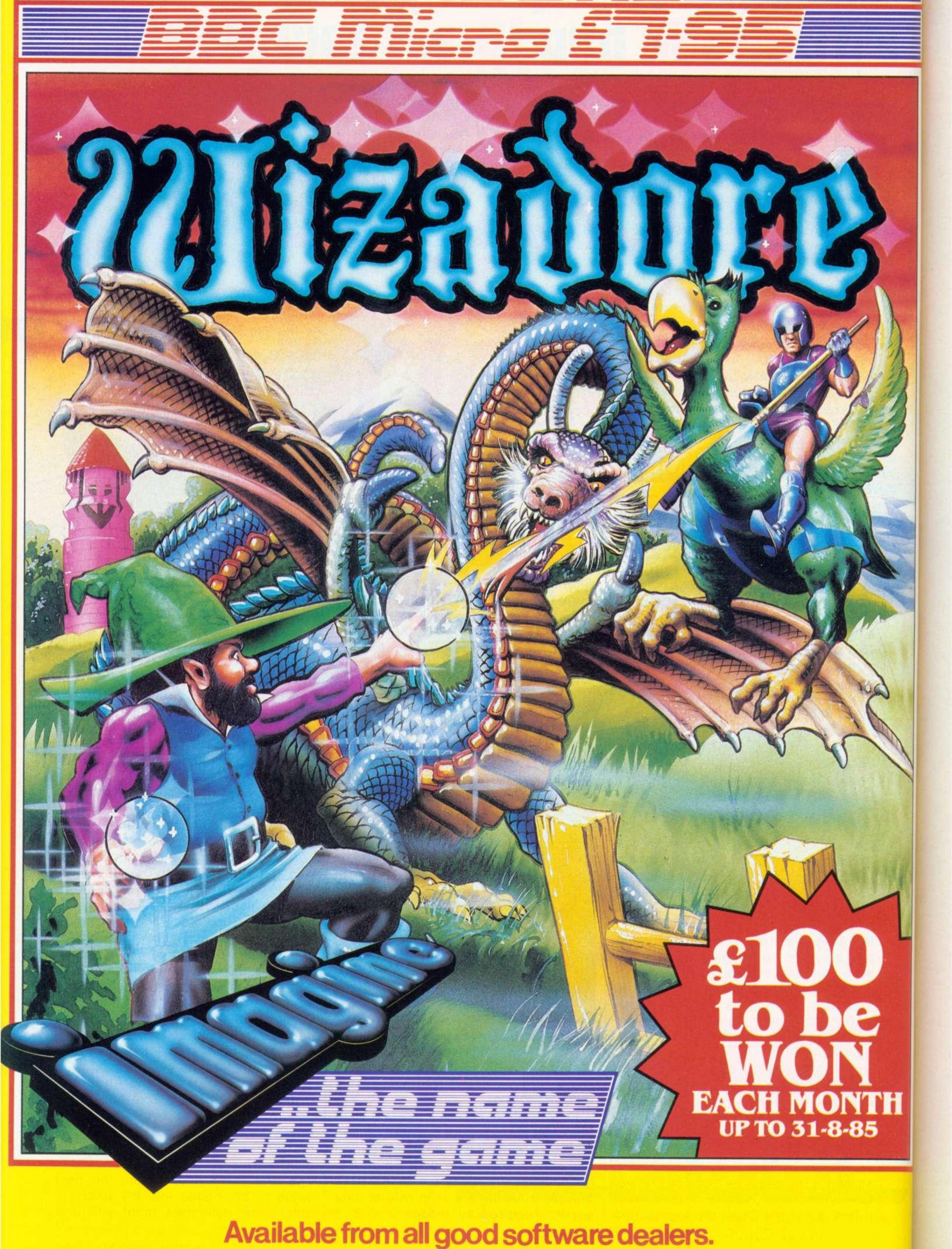
The demonstration program shows modes 0, 1, 2 and 3 on screen together

Finally, bit four is the important bit to note: this provides the main restriction on which modes are selected during the scan. If this bit is set, a high frequency clock is fed to the 6845 CRTC, thereby allowing the high rate of data access required by modes 0 to 3. If clear, a low frequency clock is selected, as used by modes 4 to 7. Obviously, this means that all the values written to the CRTC are not portable between these two groups of modes. As it is not possible easily to redefine the CTRC registers during a scan of the screen, modes to be mixed can be chosen from one group or the other but not both. Thus you cannot have mode 0, say, present together with mode 5, although mode 5 and mode 4 is possible.

A point to note here is that as far as this routine is concerned, there is no difference between modes 0 and 3 or between modes 4 and 6. This is because the additional line spacing is provided by the CRTC, not the ULA.

This brings us to the program. The first 28 lines are purely a demonstration. They set up the DLI routine data areas to display mode 0 followed by 1, 2 and finally 3 (or mode 4 followed by 5 and 6), with each mode having its default colours selected. PROCsetdlis is then called before a moire pattern is generated to demonstrate the different modes. Pressing any key other than Escape will then list the program to demonstrate what text looks like without the bits being translated for the different mode formats.

The main part of the program, PROCsetdlis, resides from line 10000 onwards. It requires two parameters, both addresses of blocks of data. The first block consists of a number of three byte entries, terminated by &FFFFFF. The first two bytes contain the next value to be loaded into the interrupt timer (low byte then high) where a


WIZADORE
BBC Micro £7.95
Wizadore
Imagine
...the name of the game
£100 to be WON EACH MONTH UP TO 31-8-85

value of &260 approximately corresponds to one line of text in a 25 line mode. The third byte contains the number of the new mode to be changed to. For speed reasons, no range checking is done on this number.

The second block of data is 22 bytes long. The first two bytes are the physical colours for colour 0 and colour 1 of any two colour mode selected. The demonstration sets these to zero and seven. Then come four bytes for colours 0 to 3 for any four colour mode. Here, the demonstration routine selects colours 0, 1, 3 and 7. Finally come 16 bytes for the colours of mode 2 if selected.

PROCsetdlis itself is not very complex. It simply assembles the machine code, allows for a *TV call (see below), switches off the flashing colours and returns. The main body of the program is contained within FNassemble. The machine code first identifies the source of the interrupt. If it is a frame sync interrupt, it resets its pointer to the start of the data and calls the DLI routine to actually restore the top of screen conditions. Note that PROCsetdlis modifies the first timer value to account for the area at the top of the screen where no data is displayed. The value added (&6C8: see lines 10060 and 10070) is correct for *TV0: values for other *TV values can be calculated from this.

The DLI interrupt selects the appropriate value to write to the ULA control register from the table at line 10700. These values are as follows:

Mode	0	1	2	3
Value	&9C	&D8	&F4	&9C
Mode	4	5	6	(7)
Value	&88	&C4	&88	(&4B)

Then the appropriate colour setting routine is selected and the default colours set up from the second data table. For an explanation of these colour routines, see last month's article. Finally, the timer is set up ready for the next interrupt.

At the end of the program, two other useful routines are appended: PROCdlisoff and PROCdlison. These allow the interrupts to be deselected and reselected from within a program if the program needs to extend the DLI data. Note that the DLI data is portable between modes within the same group, but remember the difference between 25 and 32 line modes.

To use a screen where multiple modes are running, you will need to inform the operating system which area of screen you are using, as the OS will assume that all the screen is in the mode selected when you called PROCsetdlis. To do this, you need to alter six bytes in the OS VDU workspace. The start of this workspace can be determined by using OSWORD with A = 174, X = 0 and Y = 255. This returns the start address LSB in X and MSB in Y. Calling this address A, you will need to alter A + &A, A + &4F and A + &60 to A + &63. These locations should be set as follows, depending on the area of the screen you wish to access:

&A Number of characters (not bytes) per line −1 (eg 19)
&4F Number of bytes per character (eg 32: 4 wide × 8 high)
&60 Number of colours per mode −1 (eg 15)
&61 Number of pixels per byte −1 (eg 1) or 0 for text only
&62 Graphics left mask
&63 Graphics right mask

The two graphics masks contain a pixel set in the highest colour possible in the leftmost (&62) or rightmost (&63) pixel position. For example, for two colour modes, these bytes contain &80 and &01, and for mode 2, &AA and &55. Examples in brackets are for mode 2.

When using the routine, there are a couple of general points to remember. First, you may notice slight flicker when running the program. This is caused by the DLI interrupts not having priority over the OS. To cure this totally, a re-entrant DLI and operating system interrupt routine would be required. While this is possible, it makes the software operating system dependent, as calls have to be made into the OS ROM itself rather than through the vectored calls in PAGE &FF. Advanced programmers may like to reduce the problem by disabling interrupts they are not using, thereby reducing the chance of conflict. The flicker becomes more pronounced as more DLIs are added, as the chance of interrupts clashing increases. So select your screen layout with care.

Secondly, if you are running very short of memory, you can use CLEAR to remove all the variables after using PROCsetdlis, then re-dimension the three arrays (the two containing the DLI data and the one containing the machine code: the length of this array is given by FNassemble – 0,&C000). They will then cover the same area of memory as the original arrays and these originals will be preserved, but all other variables will have been deleted.

Finally, here are a few ideas for further experimentation. It is possible to redefine the CRTC registers part way down a screen. This makes mixing of medium (modes 4 to 7) and high (modes 0 to 3) resolution modes possible but more interestingly, allows the 'start of screen memory' pointer to be changed part-way down a screen. This means that the screen data does not have to be one continuous block, so areas may be hardware scrolled individually, or repetition of data may occur. The latter technique provides considerable memory savings on games, for example, requiring a couple of layers of clouds where one cloud layer may be slightly offset and redisplayed many times.

The way to change the CRTC registers is to trick the CRTC into thinking that its screen is the length of the area of data to be displayed next. The frame sync is configured as a line sync and the new register values are set before the end of the 'frame' so they take immediate effect. Thus the CRTC completes several 'frames' for each complete TV frame.

Entering the program

The program can be broken down into three sections: the demonstration section (10 to 280), the DLI core routine and utilities (10000 to 10090 and 10730 to 10760) and the assembly section. To enter the program, first enter the following short routine:

```
10 Data=&4000
20 Data1=Data:Data2=Data
30 FOR Mode=0 TO 2
40 L=FNassemble(0,&4000)
50 L=FNassemble(2,&4000)
60 B=0
70 FOR A=&4000 TO &4000+L-1
80 B=B+?A
90 NEXT A
100 PRINT"Checksum is :";B
110 NEXT Mode
120 END
```

This is the same program as used for the colour DLIs, so if you saved it last month, you can simply re-load it. Then type AUTO 10100 and enter the assembly language section. If you now type Run, three checksums, all 29315, should be printed. If so, you can now delete lines 10 to 120 and enter the remainder of the program. If not, or if an error occurs, check the listing and correct the error. Note that the REM statements at lines 10120, 10180, 10250, 10280, 10340, 10420, 10510 and 10650 are not essential and can be shortened or ignored. Where the REM statement does not start the line, enter the line up to the REM statement before deciding whether to shorten or ignore the message. With the entire program entered, **save the program before running it in case an error still exists, as an error in the interrupt routine may corrupt the entire program.**

In Colours by Interrupts in last month's issue the three checksums should have read 20203, 21428 and 19413.

Tristram Mabbs' listing for modes by interrupts is on yellow pages 104-105.

PRINTERS

DOT MATRIX

All printers have centronic parallel interface unless otherwise stated. All printers have hi-res dot addressable graphic mode. Please send SAE for full details.

EPSON

FX80 160CPS 10" wide friction & pin feed	£347 + VAT	**£399**
FX100 160 CPS 15" wide friction & tractor feed	£499 + VAT	**£574**
RX80 F/T 100 CPS 10" wide friction & tractor feed	£239 + VAT	**£275**
RX80 100 CPS 10" wide tractor feed	£199 + VAT	**£229**
RX100 F/T 100 CPS friction & tractor feed	£385 + VAT	**£443**
8143 RS 23 Interface for FX and RX printers	£39 + VAT	**£45**
8148 RS 232 Interface with 2K buffer x on x off	£60 + VAT	**£69**
Ribbon Cartridge for RX80 FX80 & MX80	£5 + VAT	**£6**
Ribbon Cartridge for FX100 & MX100	£7 + VAT	**£8**

MP165
165CPS 10" carriage friction and tractor feed — £260 + VAT **£299**

SEIKOSHA
BP 420 designed for the business world, 420CPS in draft mode, 110CPS in NLQ mode. — £1095 + VAT **£1259**

SMITH CORONA
Fastext 80: 80 col, 80CPS. Friction feed standard — £149 + VAT **£171**

TAXAN KAGA

160CPS 10" wide 27CPS NLQ 24 × 16 matrix	£269 + VAT	**£310**
160CPS 15" wide 27CPS NLQ 24 × 16 matrix	£390 + VAT	**£449**

CANON
PW1080A
160CPS NLQ mode, 27CPS, 10" wide friction & tractor feed
£299 + VAT **£344**

PW1156A
160CPS NLQ mode, 15" wide friction & tractor feed
£399 + VAT £459

COLOUR PRINTERS

Seikosha GP700A 7 colour 50CPS printer	£299 + VAT	**£344**
Canon PJ1080A 7 colour 40CPS ink jet printer	£433 + VAT	**£499**

DAISYWHEEL

JUKI 6100/I PRINT

20 CPS Bi-Directional Logic seeking 10 12 15 CP1 + PS spacing 2K buffer best selling Daisywheel	£324 + VAT	**£373**
Singer sheet feeder unit	£182 + VAT	**£209**
Tractor Unit	£95 + VAT	**£109**
RS 232 Interface	£52 + VAT	**£59**
Spare Daisywheel	£14 + VAT	**£16**

BROTHER HR-15

13 CPS Bi-directional 10, 12, 15 CP1 + PS	**£340** + VAT	**£399**
Keyboard Unit	£139 + VAT	**£159**
Single Sheet Feeder Unit	£217 + VAT	**£249**
Tractor Unit	£95 + VAT	**£109**

QUENDATA
20 CPS Unidirectional 10 12 15 CP1 — **£239** + VAT **£275**

All our printers have 1 year warranty

MONITORS

PHILIPS
7001 High Res Green Screen with sond input £65 + VAT **£75**

GM1211
GM1211 18 MHZ High Res Monochrome Monitor with tilt and swivel stand available in green or amber etched antiglare screen (please specify colour £86 + VAT **£99**

SANYO
DM8112 12" Green screen 18MHZ Hi-Res £86 + VAT **£99**
DM9112 Hi Res Green Screen with tilt stand £109 + VAT £126

MICROVITEC CUB
1431 MS 14" RGB Normal Res Colour £173 + VAT **£199**
1451 MS 14" RGB Medium Res Colour £251 + VAT **£289**
1441 MS 14" RGB High Res Colour £417 + VAT **£479**

SANYO COLOUR
Std Res 14" £179 + VAT **£206**
Med Res 14" £299 + VAT **£344**
Hi Res 14" £449 + VAT **£517**

MICROVITEC FOR QL
1451 14" Medium Res Colour. Specially designed for Sinclair QL
£239 + VAT **£275**

ACORN

SANYO MONITOR



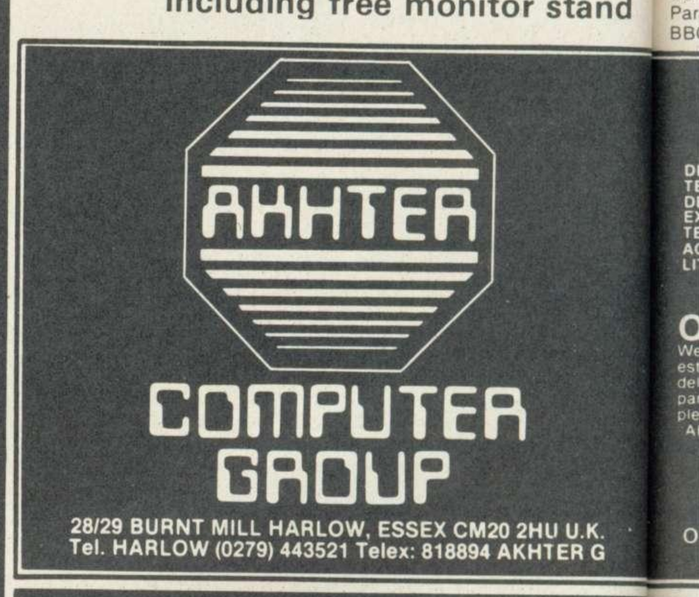
SPECIAL

CM 3125

colour monitor

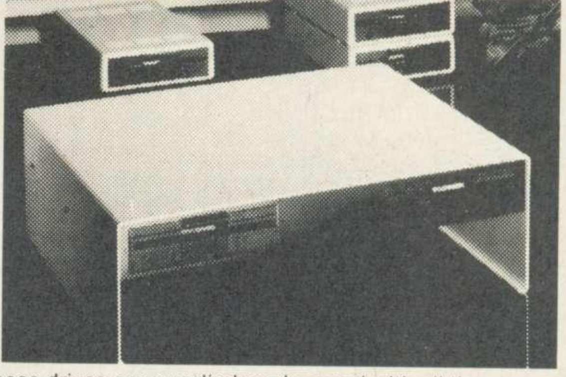
£179 inc VAT

including free monitor stand



DISC

100% BBC COMPATIBLE MITSUBISHI AND TEAC SLIMLINE DISK DRIVES



These drives are supplied ready cased with all the necessary cables formatting program and User Guide
There are some very useful utilities included on formating disc e.g.

- DISASSEMBLER: This is 6502 machine code disassembler
- DUP: To copy and rename a file on disc
- FORMAT: Formating progam for 40 & 80 tracks
- FREE: This utility provides a disk usage analysis
- MDUMP: Enables you to display and modify any part of BBC memory
- MERGE: Merge a number of text files into one file
- RELOCATE: Downloads a basic program to &E00
- SDUMP: Screen dump for EPSON In all graphic modes
- VERIFY: Verifies every sector on a disk
- MENU: A flexible menu program

RODUCTS

BBC Microcomputer Model B	£299 + VAT	£344
BBC Mod B - disk interface	£369 + VAT	£425
BBC Mod B - Econet interface	£349 + VAT	£401
BBC Mod B - disk and Econet interfaces	£409 + VAT	£471
BBC Compatible 100K disk drive	£112 + VAT	£129
BBC Compatible dual 800K disk drive	£312 + VAT	£359
Acorn Z80	£347 + VAT	£399
Acorn 6502 Second Processor	£173 + VAT	£199
Acorn Bit stick	£327 + VAT	£375
Acorn IEE Interface	£282 + VAT	£325
Acorn Electron plus 1 interface	£52 + VAT	£60
BBC Prestel Adaptor	£115 + VAT	£132
BBC Telext receiver (Aug)	£196 + VAT	£225
BBC cassette recorder and lead	£30 + VAT	£35
Disk interface kit (free fitting)	£103 + VAT	£118
Mod A to Mod B upgrade kit	£70 + VAT	£80
Fitting charge for A to B upgrade kit	£20 + VAT	£23
16K memory upgrade kit	£30 + VAT	£34
Games paddles	£17 + VAT	£19
User Guide	£15	
Advanced User Guide	£12.95	
Econet Guide	£ 7.50	
Econet interface (free fitting)	£60 + VAT	£69
Speech interface (free fitting)	£47 + VAT	£54
BBC disk manual - formating disk	£30 + VAT	£34
Parallel printer cable	£10 + VAT	£11
BBC word processor (view)	£52 + VAT	£59

YOUR CONTACT AT AKHTER
Tel: 0279 443521 (12 lines)

		EXT
DEALER/BULK ENQUIRIES	HAMAYUN MUGHAL	202
TELEPHONE ORDERS	CARON ANDREWS	210
DEALER ORDERS	JULIA ALLUM	209
EXPORT ENQUIRIES	MOHAMAD EDIB	201
TECHNICAL SUPPORT	ALAN LAFFOLEY	207
ACCOUNTS	JULIE AMBLER	211
LITERATURE REQUEST	JOHN MAULE	201

ORDERING INFORMATION

We accept official orders from UK Government and Education establishments. Carriage is £2.50 + VAT (UK only) for normal delivery. If express delivery is required please add £8.00 + VAT per parcel. We accept telephone orders on Barclay and Access card please ring (0279) 443521 (10 lines). all cheques made payable to "AKHTER INSTRUMENTS".



N.B. All prices are subject to change without notice and are rounded up to the nearest pound

OPENING HOURS: MON-FRI 9am-6.30pm. SAT 10am-5pm.
We welcome callers. no parking problems.

DRIVES

Single drive 100K 40 trks single sided	£86 + VAT	£99
Dual drive 200K 40 trks single sided	£164 + VAT	£189
Single drive 200K 40 trks double sided	£121 + VAT	£139
Dual drive 400K 40 trks double sided	£239 + VAT	£275
Single drive 400K 80 trks double sided	£152 + VAT	£175
Single drive 400K 40 80 trks switchable DS	£155 + VAT	£179
Dual Drive 400K + PSU + built-in monitor stand	£260 + VAT	£299
Dual drive 800K 80 trks double sided	£303 + VAT	£349
Dual drive 800K 40 80 trks switchable DS	£312 + VAT	£359
Dual Drive 800K 40 80 trks + PSU + built in monitor stand	£373 + VAT	£429

All above drives are low power slimline (0 3 A typ at + 12v and 0 4 at + 5v per drive) Normally extra power supply is not required. The BBC Computer power supply is designed to drive to low power drive (IT IS NOT DESIGNED TO DRIVE INTERNAL ROM BOARD)

SS DD disketts (10 Box) £18 + VAT **£20**

DS DD disketts (10 Box) £23 + VAT **£26**

BUSINESS SYSTEMS

COMPLETE BUSINESS PACKAGE



This system is based on 16 Bit 8088 Processor 128K RAM, 2X730K Floppy Disc Drives, High Res Monitor, fast (160cps) Dot Matrix Printer, Wordstar Wordprocessor, Calcstar Spreadsheet Program, complete integrated Accounts package consisting of Sales Ledger, Purchase Ledger, Nominal Ledger, Invoicing, Stock Control, Payroll and mailing list.
Complete turnkey system at an unbelievable price.
Delivered Only £1495 + VAT **£1719**
Delivered and Installed plus ½ day training £1595 + VAT **£1834**

SANYO 550
16 Bit Micro, 256K Ram, Built in full colour graphics, MSDOS Operating System, Single 16K disc and free Green Monitor, free software including Wordstar & Calcstar.
£749 + VAT = **£862**

SANYO 550-IX
As above but with dual drives 2 x 160K
£799 + VAT = **£919**

SANYO 550-360X
As 550 but with dual drives 2 x 360K
£899 + VAT = **£1034**

SANYO 550-800X
As 550 but with dual drives 2 x 800K
£999 + VAT = **£1149**

SANYO 550-10MX
As 550 but with MSDOS 2.11 Operating System and a single 10 Megabyte hard disc and 360K floppy back up.
£1995 + VAT = **£2295**

SANYO PROFESSIONAL COMPUTER

SANYO 555
16 Bit Micro, 256K Ram, double 160K disc drives, MSDOS Operating System, free Green Monitor, free software Calcstar, Infastar, Datastar etc.
£999 + VAT = **£1149**

SANYO 555-360X
As 555 but with 2 x 360zk Drives
£1099 + VAT = **£1264**

SANYO 555 800X
As 555 but with 2 x 800K Drives
£1199 + VAT = **£1379**

SANYO 555 10MX
As 555 but with MSDOS 2.11 Operating System and a single 10 Megabyte hard disc and 360K floppy back up.
£2195 + VAT = **£2525**

APRICOT PC
"Portable Executive Computer" 16 Bit Micro. 256K RAM up to 1.44 megabytes flopy disk storage. 3½" Sony disks. Portable brief case styling. Modem with auto dialler (optional) hard disk optional. Vast software library (compatible with Sirius
Apricot with Double Drive, Monitor and *Free Printer* £1790 + VAT **£2059**
Apricot with Double Drive, Double & Monitor & Printer £1990 + VAT = **£2289**

APRICOT XI
As above but with 10MB Winchester Drive and Single 315K Drive plus Superwriter, Supercalc and *FREE JUKI 6100 Printer* £2995 + VAT **£3444**

WORD PROCESSING

COMPLETE SYSTEMS FROM £650 + VAT

BBC 1: BBC Micro Model B, View (or Wordwise) Wordprocessor, Quendata 20 CPS Daisywheel Printer, High Res Green Monitor, Cassette Recorder plus 10 cassettes and all the necessary cables £600 + VAT = **£747.50**

BBC 2: BBC Micro Model B + Disk Interface, View (or Wordwise) Wordprocessor, 100K Disk Drive, High Res Green Monitor, Quendata 20 CPS Daisywheel Printer, 1 Box of Disks and all the necessary cables
£749 + VAT = **£862.00**

BBC 3: Same as System BBC2 but with 400K Drive
£825 + VAT = **£949.00**

BBC 4: Same as System BBC 2 but with 400K Drive and JUKI 6100 Daisywheel Printer
£925 + VAT = **£1064.00**

BBC 5: BBC Model B + Disk Interface, View (or Wordwise) Wordprocessor, 800K Dual Disk Drive (Mitsubishi), High Res Green Monitor, JUKI 6100 Daisywheel Printer, 1 Box (10) of 80 Track DS discs and all necessary cables £1095 + VAT = **£1260.00**

SAN 1: Sanyo MBC 550 Series 16 Bit Microcomputer, 256K Ram, Dual 160K drives (2 x 160K), High Res Graphics (600 x 200 pixels in 8 colours), JUKI 6100 Daisywheel Printer, High Res Green Monitor, 1 Box of 10 discs, Wordstar Wordprocessor, Calcstar spreadsheet and all the necessary cables £1095 + VAT **£1260.00**

SAN 2: Same as SAN 1 but with Dual 360K Drives (2 x 360K)
£1245 + VAT **£1432.00**

SAN 3: Same as SAN 1 but with Dual 720K Drives £1295 + VAT **£1490.00**

SAN 4: Sanyo MBC 555 Series 16 Bit Microcomputer, 256K Ram, Dual 160K Drives (2 x 160K), High Res Graphics (600 x 200 pixels in 8 colours) JUKI 6100 Daisywheel Printer, High Res Green Monitor, 1 Box of 10 discs, Wordstar, Wordprocessor, Calcstar spreadsheet, Mailmerge, Spellstar (dictionary), Datastar (database), Reportstar plus all the necessary cables
£1195 + VAT **£1375.00**

SAN 5: Same as SAN 4 but with Dual 360K Drives
£1295 + VAT **£1490.00**

SAN 6: Same as SAN 4 but with Dual 730K Drives
£1395 + VAT = **£1605.00**

If you require High Res Colour Monitor instead of High Res Green Monitor in Sanyo Systems please add £320 + VAT = £368 to the above prices.
***128K RAM Upgrade for all above Sanyo systems (makes a total of 256K RAM) £150 + VAT = £172.50 including fitting.**

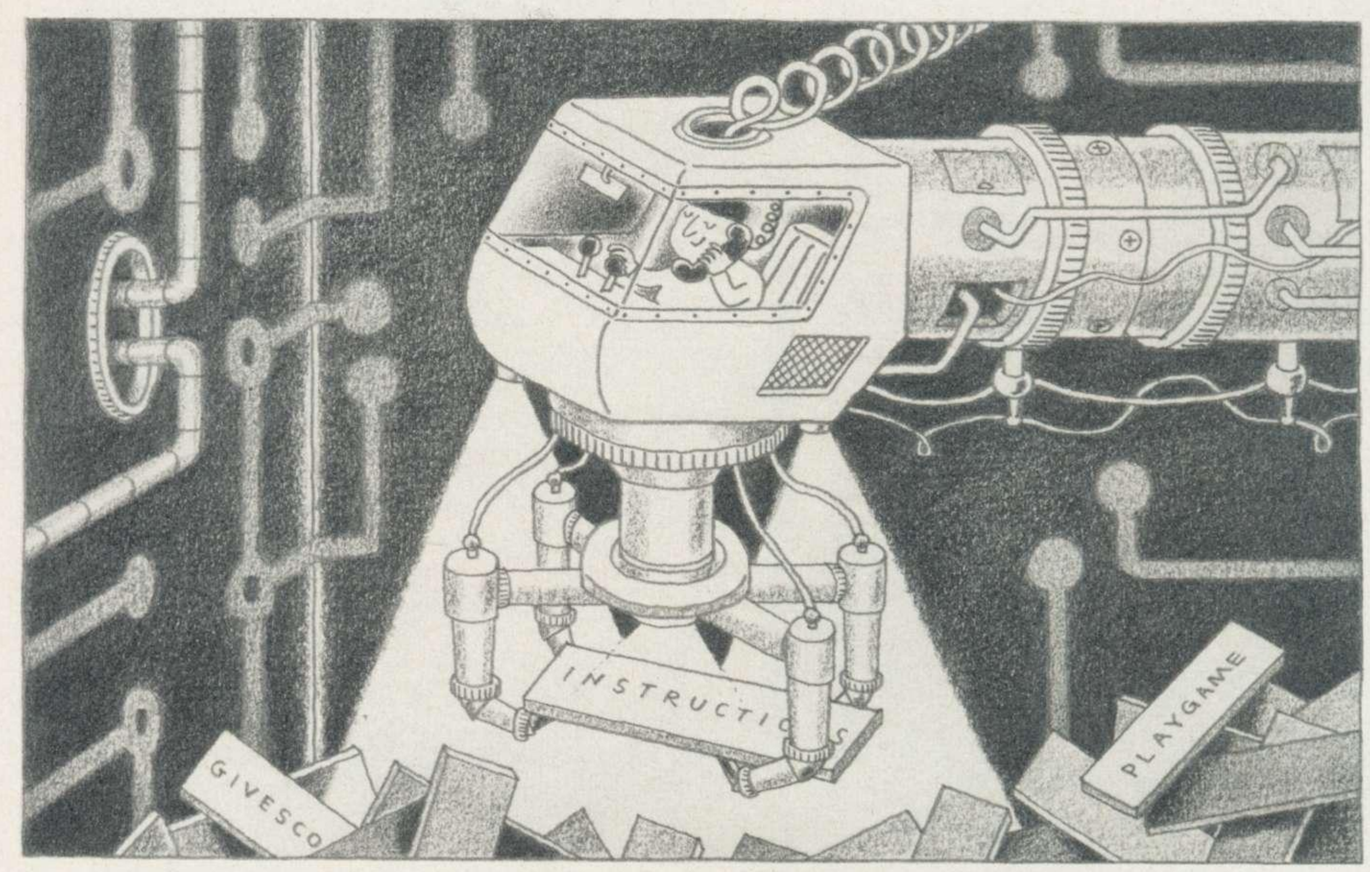


ILLUSTRATION BY CHRIS WINN

PRIVATE FUNCTIONS

Patrick Quick reveals how to implement programming structures not usually available in BBC Basic

IN BASIC you can use a 'computed GOTO' or 'computed GOSUB' using the keyword ON. This selects the line number automatically from a list, eg:

ON X GOSUB 560, 670, 345, 8765

This is equivalent to

IF X=1 GOSUB 560
IF X=2 GOSUB 670
IF X=3 GOSUB 345
IF X=4 GOSUB 8765

This is useful for producing a neat, clear choice of routine but it uses line numbers, which are not very easy to remember. It would be better to have a computed procedure call such as:

ON X PROC instructions, playgame, givescore

which would choose PROCplaygame if X=2 etc. Unfortunately this is not available in BBC Basic but it is possible to invent a 'computed function call'.

What FNon does

The function FNon, described here, picks the chosen function name from a string containing the list of names separated by commas, eg, "instructions,playgame,givescore". This string is passed as an argument to FNon together with a number which selects the required function from the list, eg:

20 A=FNon("instructions,playgame, givescore",X)

This is equivalent to

IF X=1 A=FNinstructions
IF X=2 A=FNplaygame
IF X=3 A=FNgivescore

How it works

Version 1 of FNon (listing 1) takes two arguments. The first is a string containing a list of function names separated by commas.

The second argument is a number indicating which one of these functions is required. The chosen function is selected by looking through the string for commas and splitting off the separate function names while counting down to zero (line 1040).

Variable I holds the position of the next comma in the list. This is initialised to zero so that I+1 always points to the beginning of the next function name. Subsequent commas are found by the INSTR function on line 1060. This function searches for a given string inside another string. If it is there, the value returned is its starting character position, eg,

INSTR("ABCDEFGHI","DEF")

gives the value 4.

Line 1060 searches A$+"," rather than just A$ when looking for "," with INSTR. This has two advantages. The first, and most important, is that it may be used safely with Basic 1, which has a bug in the INSTR routine. This bug causes trouble when searching in a short string for a longer string (User Guide page 281). A$+"," is always at least as long as "," so the problem is avoided. (I usually use this trick with INSTR so that my programs will work on all Beebs.)

The second advantage is that the result given by this version always points to the end of the next function name, even when there are no more commas. This makes the rest of FNon simpler to write.

If the count has not yet reached zero and there are still some function names left (line 1070) then the search is repeated and the first name is stripped off the front of the list (line 1050). When it is found, the appropriate function name is put in an EVAL expression at line 1090. This is why you can only use functions – you cannot EVALuate a PROCedure.

(If the routines you are using do not need to return a function value then you must just return a 'dummy' value which can be ignored. In other words, to turn a procedure into a function replace PROC by FN in the definition, replace ENDPROC by =1 and each time the procedure is called replace PROC thingy by X=FNthingy, where X is some variable you are not using elsewhere.)

This method allows any number of function names to be included (up to the maximum you can fit in a string, ie, 255 characters).

With ON ... GOTO or ON ... GOSUB you can pick up illegal values of X by using ELSE (although this reveals another bug in Basic 1 – see User Guide page 309), eg:

```
ON X GOTO 230, 670, 500 ELSE GOTO 800
```

If X is not 1, 2 or 3 then the program jumps to line 800. FNon does the same by returning the value FALSE (zero) if out of range (lines 1010 and 1080), while the functions chosen (FNinstructions, etc) should always return a non-zero value.

For another practical example, consider this use of FNon to choose an operation in a wordprocessing program by means of a single key:

```
100 IF FNon (''insert,delete,edit,finish'',INSTR(''IDEF'',GET$)) ELSE VDU 7 : GOTO 100
```

Line 100 uses version 1 of FNon to select FNinsert, FNdelete, FNedit or FNfinish according to the key press (I, D, E or F). If some other key is pressed then a beep sounds and the line is repeated.

Version 2

This (listing 2) allows the passing of two extra arguments, one string and one numeric (other combinations can of course be used). The parameters must be the same types for each of the selected functions. The parameters (P$ and P) are included in the definitions of FNon2 and of the chosen functions and are also included in the call of the chosen function (see amended line 1090).

Both of these versions work on Basic 1 and Basic 2.

Note that ON ... GOTO and ON ... GOSUB round down fractional values of the selector. In other words, if X is 2.6 then the second line number is chosen. FNon has been written to give the same effect. If you want to reject fractional values, simply include another test in FNon:

```
1005 IF A < > INT(A) : = FALSE
```

```
   10 INPUT "Which ? "X
   20 IF FNon("instructions,playgame,
givescore",X) ELSE PRINT "Out of rang
e"
   30 GOTO 10
 1000 DEF FNon(A$,A)
 1010 IF A<1 :=FALSE
 1020 LOCAL I:I=0
 1030 REPEAT
 1040 A=A-1
 1050 A$=MID$(A$,I+1)
 1060 I=INSTR(A$+",",",")
 1070 UNTIL A<1 OR I>LENA$
 1080 IF A>=1 :=FALSE
 1090 =EVAL("FN"+LEFT$(A$,I-1))
```

Modules for version 1

```
 3000 DEF FNinstructions
 3010 PRINT "Press lots of keys quick
ly."
 3020 =TRUE

 3100 DEF FNplaygame
 3110 PRINT "ZAP! ZAP! ZAP!"
 3120 =TRUE

 3200 DEF FNgivescore
 3210 PRINT "You lose."
 3220 =TRUE
```

Listing 1. Version 1 of FNon

```
   10 INPUT "Which ? "X
   20 IF FNon2("instructions,playgame
,givescore",X,"testing",6) ELSE PRINT
 "Out of range"
   30 GOTO 10
 1000 DEF FNon2(A$,A,P$)
 1010 IF A<1 :=FALSE
 1020 LOCAL I
 1030 REPEAT
 1040 A=A-1
 1050 A$=MID$(A$,I+1)
 1060 I=INSTR(A$+",",",")
 1070 UNTIL A<1 OR I>LENA$
 1080 IF A>=1 ;=FALSE
 1090 =EVAL("FN"+LEFT$(A$,I-1)+"(P$)"
```

Modules for version 2

```
 3000 DEF FNinstructions(X$,X)
 3010 PRINT "Using first routine"X,X$
 3020 =TRUE

 3100 DEF FNplaygame(X$,X)
 3110 PRINT "Using second routine"X,X
$
 3120 =TRUE

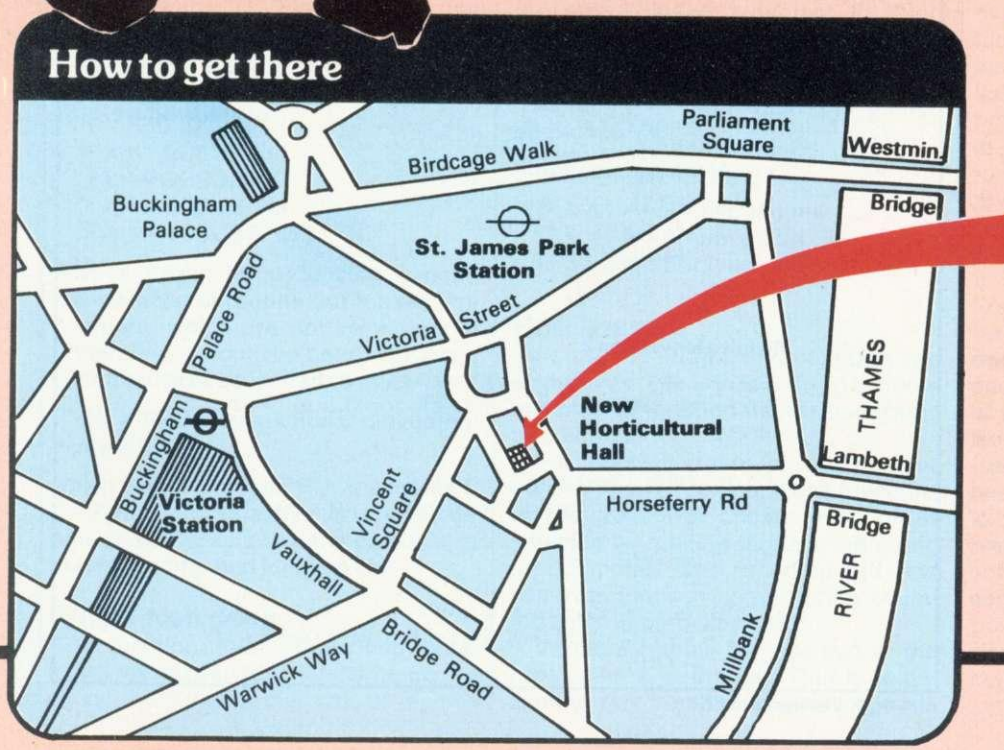
 3200 DEF FNgivescore(X$,X)
 3210 PRINT "Using third routine"X,X$
 3220 =TRUE
```

Listing 2. Version 2 of FNon

The BIG show is back in the heart of London!

Thursday to Sunday May 9 to 12

New Horticultural Hall Westminster, London SW1



Reduced prices for School/College Groups

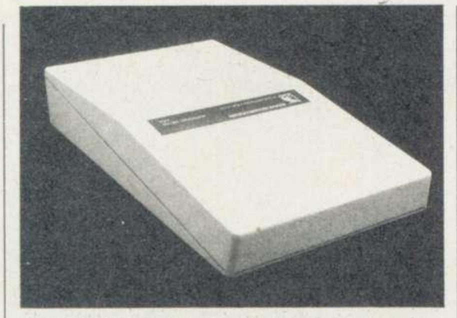
Entry only £1 per student if bookings are made in advance. Send your cheque (made payable to Database Publications) and SAE to:

Electron & BBC Micro User Show
68 Chester Road, Hazel Grove,
Stockport SK7 5NY.
Tel: 061-480 7863
Valid for a minimum of 10 people.



Simon Dally sends you searching through our pages for clues that could lead you to our super prize – a 6502 second processor or a Plus 3

TREASURE HUNT



6502 second processor for the Beeb

JANUARY

WINNERS

JANUARY'S competition produced about 300 entrants, about 85 per cent correct. It wasn't an easy one so here are the answers.

Problem 1: 232324
Problem 2: 37
Problem 3: 901 or 28, depending on your view of leading zeroes – we hadn't specified.
Day 1: Alex 2 is for real
Day 2: Alex 1 is for real
Day 3: Alex 1 is for real
Day 4 was (deliberately) a *confusione*! The two statements are either both true or both false, which is logically impossible. Either way, whichever one you chose made no difference. Correct answers were 467425 and 465623 as well as the intermediate position of those who insisted they couldn't do anything on Day 4! The equivalent numbers for those who opted for number base 28 in problem 3 (a small minority) were also accepted.

The winners of the Quinkey alternative keyboards have been notified by post and were M Brewster of Birmingham, Lars Guldberg of Norway and Andrew Mitchell of Thetford, Norfolk.

BUMPER COMPETITION

THIS MONTH'S competition is more difficult than usual – but then the prize is more mouthwatering. The winner can choose between a 6502 second processor for the BBC micro or a Plus 3 for the Electron – so please specify which you'd prefer on your entry.

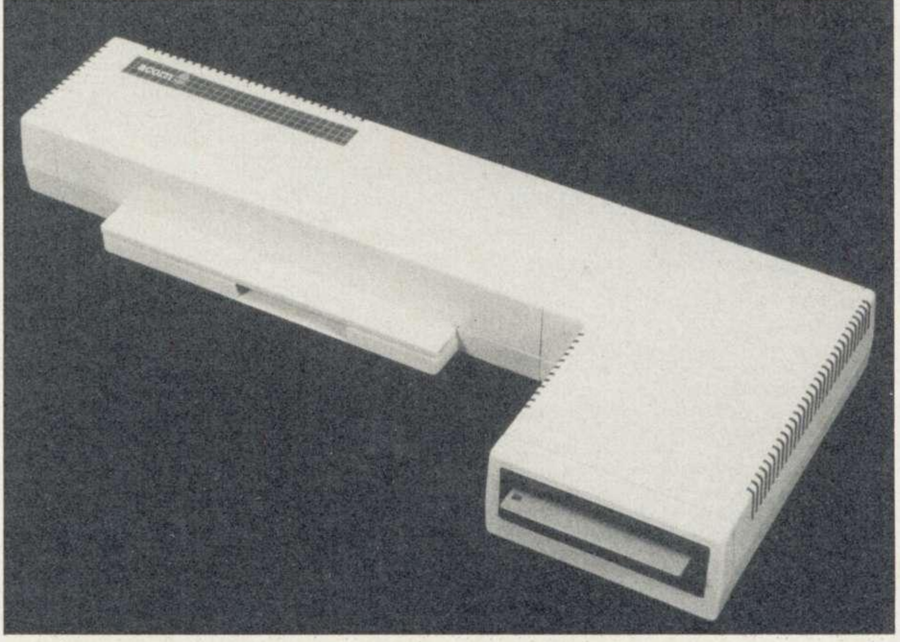
Scattered in a random order through the pages of this month's *Acorn User* are 11 separate problems for you to solve. However, you don't need to be a computer genius to get the answers – some require a little mathematical ability, others a talent with words and others the energy to seek out reference books.

In addition there are two programs you have to decipher which form part of the competition. One of them gives hints and tips about some of the more obscure clues; the other tells you about how to put the final answer together.

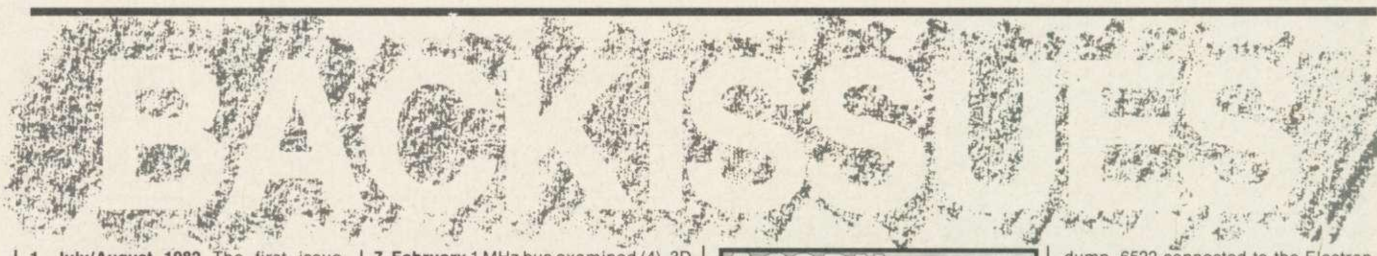
All the problems have an answer (in base 10 arithmetic), and if you find your final, overall answer isn't less than seven figures and exactly divisible by 11 you've done something wrong!

Please send your answers on a postcard to arrive not later than Friday, June 7 to May Competition, *Acorn User*, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Remember to state which micro you own.

Please do not telephone us with queries about the competition. If you are in genuine confusion follow common sense rather than imagine we are being 'clever-clever'. The editor's decision is final.



Acorn's Plus 3 disc interface for the Electron



1. July/August 1982 The first issue. Articles on drawing techniques. The BBC Computer Programme. Machine code graphics. Questions & answers. Hints and Tips. Sound. Interfacing scientific instruments. Dumb Terminals for 0.1 machines. Disc drives. Econet in schools.

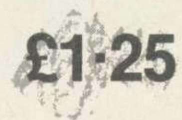
2. September Ceefax telesoftware. Beeb in business. Mailing list. Simple files. 30-Hour Basic course. Art on a micro. Music. BBC micro as a key-



board. Extra Atom commands. BBC Basic board. ULA design. Teletext graphics. Machine code graphics. Analogue input. Schools training. 0.1 cassette bug patch.

3. October Electron details. BBC TV series – confessions. Two Epson graphics dumps. Seikosha GP100 dump. Worldwide networking for BBC micro. Garbage handling. Voice ROMs. Sound pitch envelope. Moving graphics. ZX printer for Atom. RGB colour separations for Atom. Biofeedback. Book reviews.

4. November Teletext. Second BBC TV series. Machine code series 1. Programming forum. *Trek III*. Speeding up graphics. Bomber game listing. 7-tone Epson graphics dump. Atom graphics manipulation. Dumb terminal for 0.1 machine. Firework graphics. Editing tips.

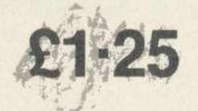


5. December BBC TV in schools. Machine code 2 – registers. Programming forum. Program generators. Carols. Hints & Tips. Logo and Turtle graphics in schools. Introduction to procedures. Software review. Atom word processing. Toolbox review. 16-colour graphics on model A. Sorting. Sound envelope design.

6. January 1983 MEP school launch. *FX commands for sound. Second BBC TV series. Machine code 3 – two pass assembly. Disc drives for the Beeb. Programming forum. Program protection. Micros in schools – new series. Commodore Pet printer used with Beeb. BBC programs written on an Atom. Extra Atom memory.

7. February 1 MHz bus examined (4). 3D Atom graphics (3). Atom BBC Board reviewed (3). Machine code 4 – memory (5). BBC Computer Literacy update (1). Atom error handling (2). Micros in schools 2 – getting organised (6). Hints and Tips (4). Beeb Forum (3). Reviews of *Wordwise* (2) and the Amber printer (1).

8. March Chess on the BBC micro (3). Sound on the Beeb (4). Printers for beginners (4). Atom analogue converter (2). Schools 3 – micros and maths (6). Machine code 5 – indirect addressing (3). DIY lightpen (5). MEP's *Microprimer* review (2). Atom Ross toolkit review (1). Beeb Forum (2). Assembly language and Pascal book reviews (2).



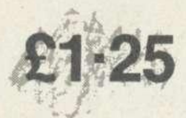
9. April *Hexangle* game listing (4). Bach on the Beeb (4). Hints & Tips on disc drives (4). Machine code 6 – the CALL statement (4). Interfacing the 1 MHz bus (3). Schools 4 – young children and micros (6). Graphics listings (2). Printers for beginners 2 (4). Reviews of BCPL, educational software and Atom software (3).

10. May Review of Basic II(1). Graphics listings(1). New *FX calls in OS1.2(1). Colour mixing on the Beeb(4). Jazz, blues and folk on the BBC(6). Schools 5 – language development(6). DIY Beeb interface box(4). Atom sound board(5). A to Z of printing: how to get going(4). Hints and Tips: PROCs, discs and FNs(5). Printer, software and book reviews.

11. June Techniques series – sorting(2). Hints and Tips: 50p network(5). Drawing techniques and CAD(5). Machine code: interrupts(6). Schools 6 – information technology. Atom Forum. Beeb Forum. Printers – write your own graphics dumps(4). Comparative review of *View* and *Wordwise*(3). Three graphics packages reviewed(3). Test of *Acorn User*'s interface box(4).

12. July Techniques – hash tables(2). Hints and Tips: logic made easy(5). Recursion and graphics(6). Handling strings(3). Two ideas for passing variables(2). Beeb aids the blind(2). DIY second keyboard(5). Beeb Forum. Sounds on the Atom(2). Hardware, firmware, software and book reviews. Atom Forum.

13. August Printer graphics and dumps(2). Techniques – Tree structures and sorting(2). All the fun of the fair(7). 40/80 disc copier(2). Colour painting(5). Basic II: random access files(2). Screen dumps for Olivetti, Centronics and Seikosha(5). Atom strings(3). Reviews of Tandy CGP115 printer, five educational packs, A to D converter.



14. September Techniques – ink-blots and mazes. Painting by lightpen. DFS space explored. Beeb Forum. *Mega*



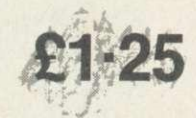
Monsters game listing. Machine code graphics dumps. Atom Forum. Atom cassette recorder check. Reviews of Atom RAM boards, Cumana disc manual, *Logo* for schools, Hobbit floppy tape and books.

15. October Women and computing. Techniques – random numbers. Review of Computer Concepts' *Beebcalc*.



Fractal graphics. 57 files on 40 & 80 track discs. *Vampire* game listing. Beeb Forum. Assembly code controls tab key. Osfile merging. Atom future. Atom verify routine. Reviews of *Vu-Type*, Procyon Atom book, Epson FX80, Teletext adapter, disc drive, software.

16. November Techniques – impossible problems. Contour graphics. Connecting two Beebs together. XREF: sorts & lists variable, function and procedure names. Assembler utilities in Basic II. OS, VDU, *FX, OSBYTE calls – **pull-out poster**. Disc overlays. Adding extra Atom commands. Reviews of 7 educational packs, Atom ROM, books, games.



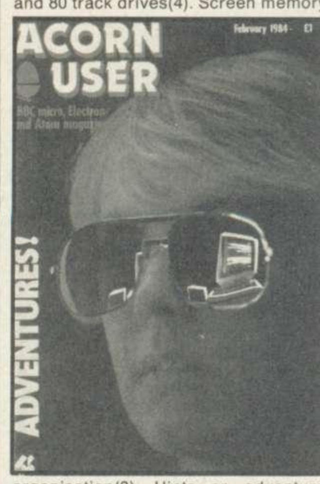
17. December Random graphics. Animated graphics in colour. Techniques – graphs. Hints & Tips. Universal printer dump. 6522 connected to the Electron. Saving machine code. Beeb Forum. Graphics **pull-out poster**. **Index:** July 82–July 83. Forum Extra: EQUS. BBC helps the disabled. Schools – data processing. Transferring data between Beebs, Atoms . . . or Pets. Atom block demolition utility. Atom disassembler program. Reviews of software, books, educational programs from Chalksoft.

18. January 1984: Games special issue Techniques – graphs part 2. Stacks and queues, Basic and languages. Hints & Tips. Voice chip revealed. How to write games. Electron interfacing. Beeb Forum. Life graphics routines. *Defencecom* game listing. *The Train Game* listing. Machine code graphics. Where to put machine code. Schools – handling data. Juki daisywheel printer examined. Atom Forum and adventure.



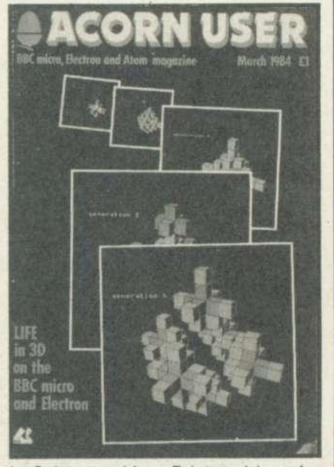
Reviews of utilities, software, *Beeline* wordprocessor, educational packages, two chess programs.

19. February: Adventures special issue Techniques – efficient sorts(3). PROC for a numeric keypad on the Beeb keyboard(1). 12 graphics listings(1). Random access filing on disc(5). Locking files(2). MCP40 printer/plotter looked at(5). Hints & Tips(3). Beeb Forum(2). Make discs readable on 40 and 80 track drives(4). Screen memory

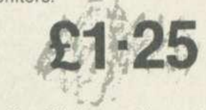


organisation(3). Hints on adventure design(3). Adventure action(4). Adventure ideas in computer language(2). Text compression(2). Word-crunch-

ing(4). VIA chip on Electron to drive a parallel printer(3). Atom Forum(2). Schools – simulation packages(4). Reviews: *Disc Doctor*, Leasalink's DFS upgrade, Hitachi's microdrive system, Solidisk's sideway RAM board, software.
20. March Utility: timing routine. Fractals. Teletext and mode 7 dump. ROMs reviewed. Hints & Tips. Beeb Forum. Add sounds to your games. Learn Lisp



1. Cube graphics. Printer driver for View. Basic II from Basic I. Beeb's ADC chip. Atom Forum. Listing formatter for the Atom. Atom 'bytes free' routine. Schools – test of *Factfile*. Keyboard skills. Amcom DFS v Acorn DFS. Reviews: *Beebpen* wordprocessor, Atom expansion system, software, books.
21. April Beeb graphics on TV(3). 6845 chip explored(3). Advanced filing systems(1). Lisp 2(4). Hints & Tips(3). Beeb Forum(4). Choose disc tracks to copy(4). Function key editing(4). Teletext dumps(3). CES scrutinised(3). Passing variables(2). Computer Concepts' graphics ROM(4). Schools – simulations(4). Calculating Easter dates(3). Better programming(3). Atom Forum(2). Atom ROM routines(5). Converting BBC to Atom Basic(2). Three printers compared(2). Reviews: software, Aries B20 RAM board, *Toolkit*, Monitors.



22. May Bitstik graphics system. Hints & Tips. 6502 second processor examined. Lisp 3. Beeb Forum. Disc utility to keep track of available space. Statistics. Pattern graphics. OSWORD explained. 4 colour graphics listings. Second-hand



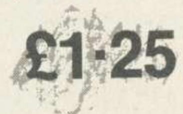
disc drives. Education – do girls get a fair deal? Atom Forum. BBC to Atom Basic 2. Reviews: British Micro's Grafpad, *Edword* wordprocessor, 4 sprite generators, Opus microdrive, Beasty, software.
23. June Acorn Z80 second processor(3). Forth(2). Graphics to brighten up your games(2). Soft Pottery graphics(4). Go faster and save memory space(3). Rapid search and load routine for tapes(2). How the Beeb and Electron work 1(3). Business: reviews and how to gently enter office computerisation(4). Education – adult literacy(3). Dumping Atom programs on the BBC(2). Atom Forum. Software copyright laws(2). Hints & Tips(4). Techniques – B-Trees(3). Beeb Forum(2). Reviews of monitors, printers, books, software, adventures, EPROM programmer.
24. July Communications: the future; portable micros; modems & electronic mail. Hints & Tips. First Byte: using your micro. Beeb Forum on Basic. How it works II: slow down the Beeb. Business: Acorn's Z80 software, Starbase ROM. Education: a look at Edfax, how to teach facts. Atom Forum. Converting BBC to Atom Basic. Reviews:



Electron Plus-1, Solidisk's 128k RAM board, three IEEE interfaces, Canon colour and Brother printers, ADE ROM.
25. August Downloading the weather. Teaching tots: keyboard overlays, activity board. First Byte: writing & debugging programs. Hints & Tips. Beeb Forum: 6502 second processor & Tube tips. How it works III: random numbers. Business: Plan software for Z80. Atom Forum, avoiding errors. Reviews: 3 drawing packs, Torch Unicomm, MCP's Interbeeb, software plus for Micronet.
26. September Decoding radio signals, First Byte: getting moving. Hints & Tips.



Education: problem solving. Sprite design and animation part I. Beeb Forum: fastest dump. Write your own disc formatter. How it works IV: random number generator. Business: Nucleus software for Z80, accounts. Atom Forum, ? and !. Reviews: Torch Unicorn, Quinkey, Parfitt plotter, Turbo compiler, Multi-aid.



27. October The BBC and space. First Byte: noises on the Elk. Hints & Tips. Sprite design and animation part II. Programming the 8271. Sorting techniques. Diagnosing ills in the Beeb. Beeb Forum: NFS update. Education: report on government scheme, review of Microtext. Atom: wordprocessor. Communications: bulletin boards. Reviews: Basic utility ROMs, sideways ROM sockets, Bearsoft's Editor, Watford's Buffer & Backup, Ampersand's Colour module.
28. November Acorn's ABC range. First Byte: drawing. Hints & Tips: 3D-effect printing. Sprite design and animation part III. Floating point variables. ROM juggler. *Micro Live*. Education: news, Edword in the classroom, school quiz. Atom forum: hardware, the Auto command. Reviews: Six turtles and buggies. Toad's extension socket, Watford's Speech Synthesiser and



Beebfont ROM, BBtype, Romex 13 ROM board, 3 language coaching packs, two graphics tablets.
29. December Guide to bar codes. First Byte: text & graphics windows. Hints & Tips: control codes for Epsons. The Domesday project. Low-cost keyboard for the Beeb. Dumping games' screens. Speed up your micro. DIY database. Education: news, science quiz, review



of the Dudley suite of software. Atom: Forum, build a ROM pager, competition. Reviews: 6 databases compared, part I of lightpens, Acornsoft's Logo and Pascal, best games of 1984.
30. January 1985 Games special: Quadline, Picture Puzzle, musical tunes. Colourfill graphics. Hints & Tips. Operation



Raleigh report. Setting up your own teletext database. Second processors examined. Education: news, activity board revisited. Reviews: 6 wordprocessors compared, three astronomy packs, software for lightpens.

Sold-out copies

Eleven issues are not available – July 1982; February, March, April, May, June, July and August 1983; February, April and June 1984. Photocopies of articles are available at 18p a page (minimum charge 50p, inclusive of postage). Orders should be addressed to AU Photocopies, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Figure in brackets indicate the number of pages in each article.

HOW TO ORDER

Fill in the order form on page 96 and send with your cheque or postal order for £1.25 per issue (made payable to Redwood Publishing) to Acorn User Services, PHS Mailing Ltd, PO Box 14, Horley, Surrey.

TWELVE TEMPTING TITLES

Acorn User presents 12 titles to captivate, entertain and educate. Could you run a railroad?... find out with *Trains*. Try your hand at swordfencing with *Swordmaster*. Break into the computer with *Hacker 2000*. Beat the bacteria in *Corpuscle*. Face the final frontier in *Trek*. Try three great games with our compendium. Or see how good your adventuring skills are with *Vampire Castle* and *Flint's Gold*. What more could you ask for? All these tried, tested and developed by Micrograf.

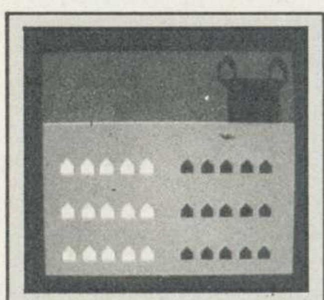


Make sure you play this adventure with the lights on. You can almost smell the dank odours and feel the terror around every corner.
£6.95 Cassette, £9.95 Disc (40/80) BBC micro only

TRAINS

This classic game by Peter Balch requires quick wits and clear thinking. Your aim is to manoeuvre a number of trains around a complex network of track, as you pick up fare-paying passengers and deliver them to their destinations.
£7.95 Cassette, £10.95 Disc (40/80)
BBC micro only





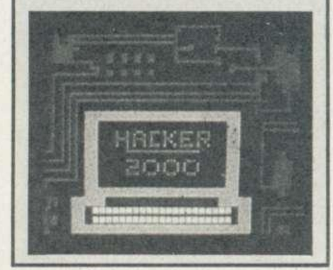
COMPENDIUM

Three *Acorn User* games. In HEXANGLE you and the micro take turns in drawing lines between six points. In MEGA MONSTERS you are confronted by waves of aliens while you rescue stranded mutants. VAMPIRE is a two-player action game.
£7.95 Cassette, £10.95 Disc (40/80) BBC micro only

HACKER 2000

In the year 2000 only two classes survive, Programmers and Proles. As a Prole, your only escape from a life of drudgery is to 'hack' your way into the massive Multivax complex in order to change your Brain Scan Report.
£7.95 Cassette, £10.95 Disc (40/80)
BBC micro only

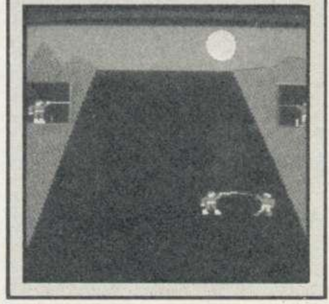




In your search for the legendary Flint's Gold you will sail the Spanish Main to a land of bloodthirsty pirates.
£6.95 Cassette, £9.95 Disc (40/80) BBC micro only

SWORD MASTER

SWORD MASTER is one of the few two-player games around, and is designed for joystick or keyboard. It is based on the fencing rules written in 1190 by Herman von Salza for the Deutscritter Order of Teutonic Knights.
£7.95 Cassette, £10.95 Disc (40/80) BBC Micro and Electron





CORPUSCLE

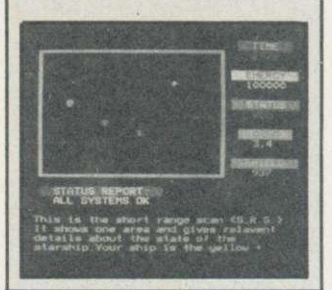
In CORPUSCLE you assume control of the body's defences, journeying into the three-dimensional labyrinth of the human arterial system. Invading colonies of bacteria advance relentlessly and you must destroy as many as you can.
£7.95 Cassette, £10.95 Disc (40/80)
BBC micro only

TREK

TREK was the first game to take advantage of voice synthesis on the BBC micro – and uses joystick or keyboard.

Trek puts you in charge of a Starship with the task of wiping out an alien fleet.
£7.95 Cassette, £10.95 Disc (40/80) BBC micro and Electron





ACORN USER SOFTWARE

Please send me: 40/80 disc* (£10.95) Cassette* (£7.95)
Crazee Caverns ☐ ☐
Mars Mission plus Astro Blaster ☐ ☐
Grafpak plus Maze ☐ ☐
Tellscope ☐ ☐

40/80 disc* Cassette*
Other title.................. ☐ ☐
.... ☐ ☐
Total value of my order is £..................

I enclose a cheque/postal order payable to Redwood Publishing for £..........
Please debit my Access/Barclaycard
Account No ☐☐☐☐☐☐☐☐☐☐☐☐☐ Expiry date ☐☐☐☐
Name.................. Address..................
.... Post code..................
Signed.................. Date..................

Send this form with your remittance in an envelope to: PHS Mailing Ltd, PO Box 14, Horley, Surrey. All the above prices include VAT, postage and packing. **Tick appropriate box(es)*

HOW TO ORDER

You can order all the games on these pages by filling in the order form on the left.

DISC EXCHANGE SERVICE

If you've bought Swordmaster or Trek on tape you can now send it to the address on the coupon on the left, together with a cheque for £3.50, and we will exchange it for a disc (which runs on 40 or 80 tracks).


GREAT NEW GAMES FROM ACORN USER
CRAZEE CAVERNS
CRAZEE CAVERNS: Pete the Potholer is on an epic journey through a fantastic underworld ruled by Willy the Wierd. Pete must take control of each of the caverns making up this empire step-by-step. To help in this task, a local wizard has coated his feet with a magic dye, so Pete can see how much ground he has covered.
TELLSCOPE
TELLSCOPE is an early learning package for 2 to 10 year-olds which provides a kaleidoscope of words, pictures and music. It is designed with options to test word/picture recognition and association, as well as memory and speed, and includes upper or lower case text. These options make it suitable for a wide range of ages, and for use with or without adult supervision.
Although the application is serious, the emphasis is on fun, and to add to this a selection of nursery rhyme tunes is played while the program runs.
Crazee Caverns, Tellscope, Mars Mission + Astro Blaster and Grafpak are available for the BBC micro at only £7.95 (cassette), £10.95 (40/80 disc)
MARS MISSION + ASTRO BLASTER
MARS MISSION: Mars is your destination. The mission – to rescue fellow astronauts stranded on the bleak, hostile surface below. But between your orbiting space station and the safety of the colony's landing pads are the deadly meteor showers and marauding aliens.
ASTRO BLASTER: As commander of the SS Destroyer, you patrol space to seek out and destroy asteroid swarms threatening the space lanes. But these are not the only peril on the fringes of civilisation – alien pirate ships prey on any ship they find. With every few waves, you must return to base to refuel, but beware, docking is no easy task.
GRAFPAK
GRAFPAK is a mode 7 graphics utility incorporating machine code routines not available in other packages, eg Draw, Plot, Fill. It's easy to use and provides a useful tool for the construction of advanced teletext graphics for games, or any other software.
PLUS 3D MAZE – a game which not only provides an excellent demonstration of Grafpak and its speed, but also hours of fun.
Machine code routines in both programs can be adapted for your own applications, making the package extremely good value for money.
95
ACORN USER MAY 1985

EXPRESS ORDER FORM

ACORN USER SUBSCRIPTIONS

Please start my subscription to Acorn User from the next available issue as indicated:



	12 months	24 months
01: UK	£15 ☐	£30 ☐
02: Europe	£25 ☐	£50 ☐
03: Middle East	£30 ☐	£60 ☐
04: The Americas and Africa	£30 ☐	£60 ☐
05: All other countries	£35 ☐	£70 ☐

Name

Address

Please answer these questions to help us improve your magazine.

1 Do you use your micro for?:
1 ☐ school 2 ☐ business 3 ☐ hobby

2 Do you have, or intend to buy, any of the following?:
1 ☐ monitor 2 ☐ disc drive 3 ☐ second processor
4 ☐ printer 5 ☐ modem

3 How many software packages do you think you will buy in the next 12 months?:
1 ☐ 0-5 2 ☐ 6-10 3 ☐ 10 or more

☐ I enclose my cheque/postal order/sterling bank draft payable to Redwood Publishing for £..............
☐ Please debit my Access/American Express/Barclaycard

Account no.

Expiry date

Signed.. Date..........................

Send this form, with your remittance, in an envelope, to Acorn User Subscriptions, Redwood Publishing, 68 Long Acre, London WC2E 9JH

ACORN USER SERVICES

BACK DATED ISSUES @ £1.25 per copy

		MONTH	YEAR	
.... AU	issue	....	....	£.......
.... AU	issue	....	....	£.......
.... AU	issue	....	....	£.......
			Total	£.......

BINDERS

In red with silver logo on the spine. Holds 12 issues of over 200 pages. ONLY £4.75 inc. p&p.

.... RP01 Binders @ £4.75 £.........

Please add £1.00 each for overseas items.
Please allow 28 days for delivery.

Name..............................

Address..............................

☐ I enclose my cheque/PO payable to Redwood Publishing for £..........................

☐ Please debit my Access/Barclaycard

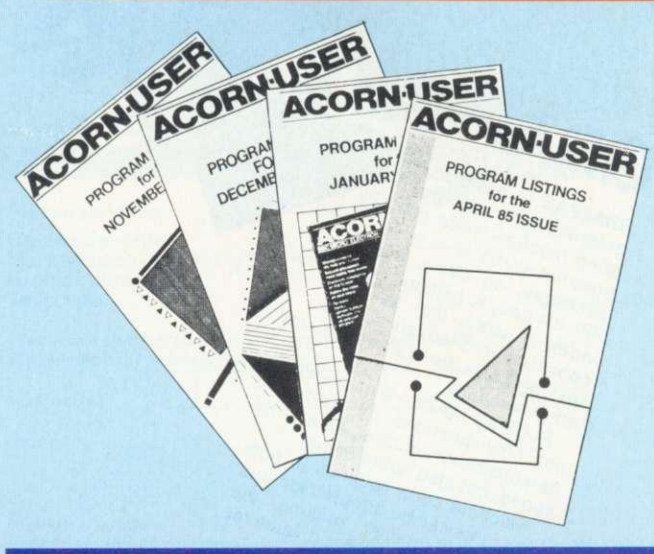
Account no.

Expiry date

Signed.. Date..........................

Send this form, with your remittance, in an envelope, to Acorn User Services, PHS Mailing Ltd, PO Box 14, Horley, Surrey. All the above prices include postage and packing.

ACORN USER SOFTWARE



MONTHLY PROGRAM LISTING CASSETTES

Please send me a cassette of all major BBC micro and Electron program listings (May issue)

@ £3.75 Total £..........................

Name..............................

Address..............................

☐ I enclose my cheque/PO payable to Redwood Publishing for £..........................
☐ Please debit my Access/Barclaycard

Account no.

Expiry date

Signed.. Date..........................

Send this form, with your remittance, in an envelope, to Acorn User Software, PHS Mailing Ltd, PO Box 14, Horley, Surrey. All the above prices include postage and packing.

24 HOUR PHONE SERVICE (02937) 72208

Please add £1.00 each for overseas items.
Please allow 28 days for delivery.

See 'Hints & Tips', page 39

Listing 1. D Webb's short routine to display teletext codes

```
10 REM Listing 1
20 FOR N=160 TO 255
30 PRINT"Character ";N;CHR$(146);CHR$(N)
40 A=GET
50 NEXT N
```

Listing 2. C J Davies' program to select no filing system

```
   10 REM Martin Phillips
   20 REM Hints & Tips
   30 REM BBC & Electron
   40 REM Acorn User May 1985
   50 :
   60 FOR opt=0 TO 2 STEP 2
   70 P%=&900
   80 [OPT opt
   90 .ctfs CPY #0:BNE nofs
  100 .ocfl CMP #0:BNE nofs
  110 .zacc LDA #0:RTS
  120 .nook SEC:RTS
  130 .vfsc CMP #3:BEQ badc
  140       CMP #6:BCC nofs
  150       CMP #7:BNE exit
  160       LDX #0:LDY #0
  170 .exit RTS
  180 .nofs BRK
  190 ]
  200 $P%=CHR$&C0+"No filing system"+CHR
$0
  210 badc=P%+18:$badc=CHR$0+CHR$&FE+"Ba
d command"+CHR$0
  220 NEXT opt
  230 A%=6:CALL !&21E:         REM warnin
g of changing vectors
  240 A%=143:X%=15:CALL&FFF4: REM servic
e call
  250 :
  260 FOR I%=&213 TO &21F STEP 2:?I%=9:N
EXT I%
  270 ?&212=nofs: REM OSFILE -no operati
on permitted
  280 ?&214=ctfs: REM OSARGS -only able
to return current FS (=0)
  290 ?&216=nofs: REM OSBGET -no operati
on permitted
  300 ?&218=nofs: REM OSBPUT -no operati
on permitted
  310 ?&21A=nook: REM OSGBPB -no operati
on permitted (carry set)
  320 ?&21C=ocfl: REM OSFIND -no operati
on permitted
  330 ?&21E=vfsc: REM FSCV   -only retur
n 0 as file handle
```

-. --- --- ..-. ..- ... . .-. -.. . ..-. .. -. .- -...
.-.. . -.- . -.-- ... --- -. .- -... . . -...

See 'Cartoons by Computer', page 72

TWO demonstration films are contained on the monthly listings cassette and will also be available on Micronet 800 towards the end of April. Due to their size and the problems involved in entering data we are unable to present them in this issue of *Acorn User*. However this should not prevent you from designing your own films, using the program as instructed.

The first demonstration is the file "DEMO", which shows a character performing a series of somersaults.

The second file is called "RUN" and depicts the character running.

Because of the size factor, DEMO can only be run in Mode 5 on a disc-based machine. To load RUN for showing in Mode 1 on a disc-based machine, PAGE must be set to &1400 before loading *Animator*, ie:

```
PAGE=&1400
NEW
CHAIN"ANIMATE"
```

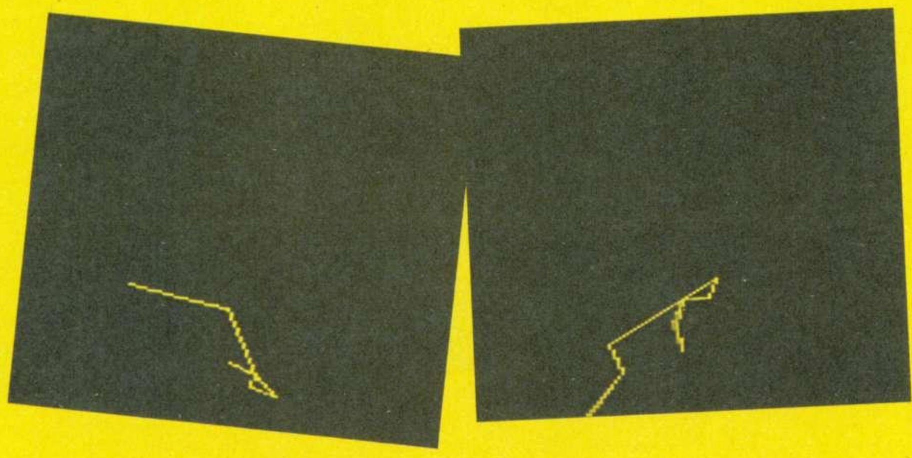
Electron Plus-3 users will not be able to lower the setting of PAGE and will therefore only be able to use DEMO and RUN in Mode 5.

When showing a film sequence, the current frame number is displayed in the top left-hand corner of the screen. If you wish to remove this, then simply delete line 1140 from the listing.

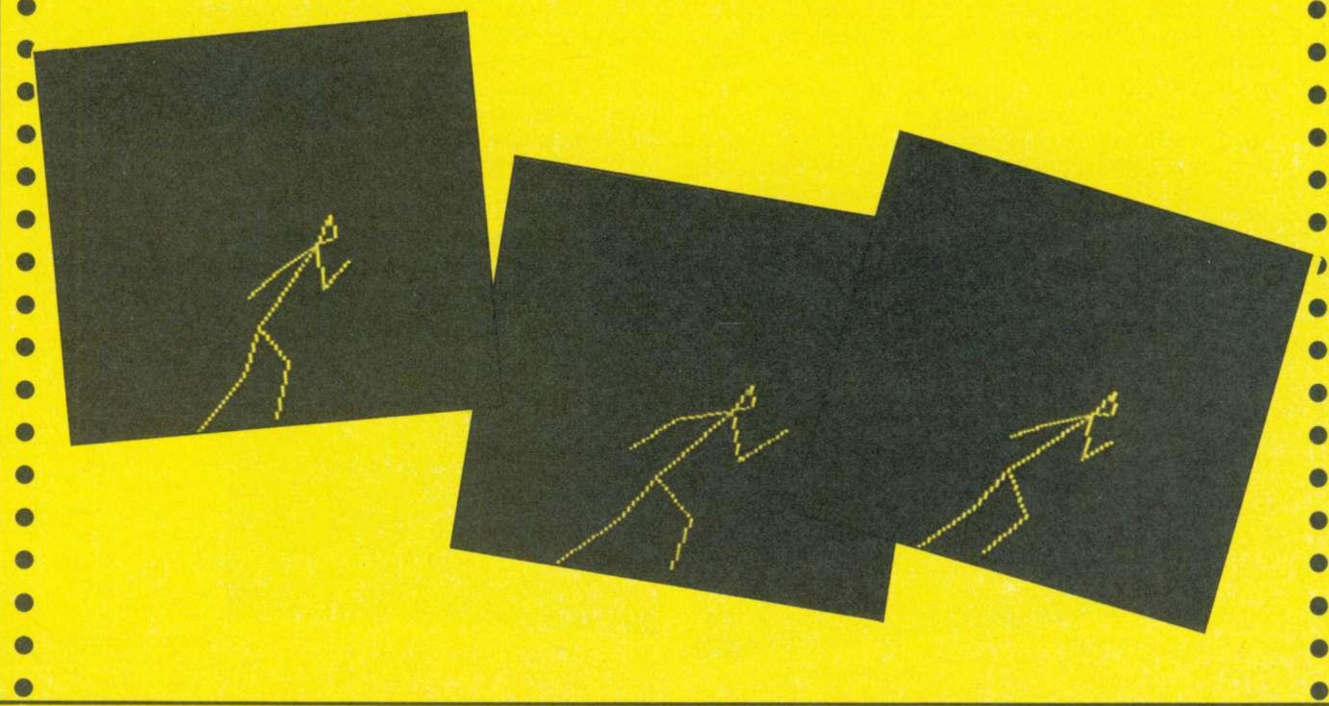
```
   10 REM Animator
   20 REM Joe Faith
   30 REM For BBC and Electron
   40 REM (C) Acorn User May 1985
   50 :
   60 ON ERROR GOTO 2730
   70 REPEAT
   80 CLS:INPUT''"Enter mode(1 or 5)";M%
   90 UNTIL M%=1 OR M%=5:MODE M%
  100 PROCset_up
  110 PROCset_var
  120 PROCmenu
  130 END
  140 :
  150 DEF PROCmenu
  160 REPEAT:G%=0:CLS
  170 PRINT''''"1:Show film"
  180 PRINT"2:Edit film"
  190 PRINT"3:Load new film"
  200 PRINT"4:Save present film"
  210 PRINT'"<ESCAPE>:Quit"
  220 G%=VAL(GET$)
  230 IF G%=1 PROCshow
  240 IF G%=2 PROCedit
  250 IF G%=3 PROCload
  260 IF G%=4 PROCsave
  270 UNTIL eternity
  280 ENDPROC
  290 :
  300 DEF PROCset_up
  310 FOR Q%=0 TO 2 STEP 2:P%=&B00
  320 [OPTQ%
  330 .man
  340 LDX #0
  350 .nextlimb
  360 INX
  370 LDA #25
  380 JSR &FFEE
  390 LDA &70,X
  400 CMP #100
  410 BEQ move
  420 LDA #5
  430 JSR &FFEE
  440 CPX #100
  450 BNE coords
  460 .move
  470 LDA #4
  480 JSR &FFEE
  490 INX
  500 .coords
  510 LDA &70,X
  520 TAY
  530 LDA (&84),Y
  540 ASL A
  550 STA &8E
  560 LDA #0
  570 ADC #0
  580 ASL A
  590 STA &8D
  600 LDA &8E
  610 ASL A
  620 STA &8E
  630 LDA &8D
  640 ADC #0
  650 STA &8D
  660 LDA &8E
  670 JSR &FFEE
  680 LDA &8D
  690 JSR &FFEE
  700 INY
  710 LDA (&84),Y
  720 ASL A
  730 STA &8E
  740 LDA #0
  750 ADC #0
  760 ASL A
  770 STA &8D
  780 LDA &8E
  790 ASL A
  800 STA &8E
  810 LDA &8D
  820 ADC #0
  830 STA &8D
  840 LDA &8E
  850 JSR &FFEE
  860 LDA &8D
  870 JSR &FFEE
  880 CPX #18
  890 BNE nextlimb
  900 RTS
  910 ]
  920 NEXT Q%
  930 ENDPROC
  940 :
  950 DEF PROCshow
  960 CLS
  970 F%=0:C%=0:L%=N%:S%=2:D%=0
  980 REPEAT
  990 INPUT'''"Enter delay :"A$
 1000 UNTIL VAL(A$) >0
```

```
1010 INPUT''"Single step (y/n)";A$
1020 IF FNcaps(A$)=89 S%=1 ELSE S%=0
1030 INPUT''"Entire film (y/n)";A$
1040 IF FNcaps(A$)=89 GOTO 1100
1050 REPEAT
1060 CLS:PRINT''"Number of frames:";N%
1070 INPUT'"Enter first frame"F%
1080 INPUT'"Enter second frame"L%
1090 UNTIL F%>0 AND F%<L% AND L%<N%
1100 CLS:C%=F%:F%=B%+F%*24
1110 L%=B%+L%*24
1120 J%=1:VDU 19,J%,0;0;19,2,7,0;0;
1130 FOR Q%=F% TO L% STEP 24
1140 PRINTTAB(0,1);C%
1150 GCOL 1,J%:!&84=Q%:CALL man
1160 VDU 19,J%;0;0;19,3-J%,7,0;0;
1170 GCOL 2,J%:!&84=Q%-24:CALL man
1180 VDU 19,J%,7,0;0;19,3-J%,0;0;
1190 J%=3-J%:C%=C%+1
1200 IF S%=2 GOTO 1240
1210 IF S%=1 A$=GET$
1220 TIME=0
1230 REPEAT UNTIL TIME>D%
1240 NEXT Q%
1250 PRINT"Press key for Menu";
1260 A$=GET$:ENDPROC
1270 :
1280 DEF PROCedit
1290 REPEAT
1300 CLS:VDU 20
1310 REPEAT
1320 PRINT'''"Number of frames-";N%
1330 INPUT'"Which frame";M%
1340 UNTIL M%>=0
1350 P%=B%+M%*24
1360 IF P%>HIMEM-24 PRINT"NO ROOM!":GOTO 1330
1370 IF P%>E% PROCtop
1380 S%=0:O%=P%-24
1390 REPEAT:CLS
1400 X%=P%+S%*2:x%=?X%
1410 Y%=P%+S%*2+1:y%=?Y%
1420 IF M%>0 GCOL 0,1:!&84=O%:CALL man
1430 GCOL 0,3:!&84=P%:CALL man
1440 PRINT"Present frame-";M%
1450 C%=GET
1460 IF INKEY(-1) A%=4 ELSE A%=1
1470 x%=x%+(C%=136)*A%
1480 x%=x%-(C%=137)*A%
1490 y%=y%+(C%=138)*A%
1500 y%=y%-(C%=139)*A%
1510 IF x%>255 x%=255
1520 IF y%>255 y%=255
1530 IF x%<0 x%=0
1540 IF y%<0 y%=0
1550 ?X%=x%:?Y%=y%
1560 C%=C% AND &DF
1570 IF C%=73 PROCinter
1580 IF C%=67 PROCcopy
1590 IF C%=83 PROCsame
1600 IF C%=76 PROClimb
1610 UNTIL C%=70
1620 UNTIL eternity
1630 :
1640 DEF PROCset var
1650 B%=LOMEM+300:eternity=0:*FX 4,1
1660 FOR Q%=&71 TO &82:READ W%:?Q%=W%:NEXT Q%
1670 FOR Q%=B% TO B%+23:READ W%:?Q%=W%/4:NEXT Q%
1680 *FX 12,20
1690 E%=B%+24:N%=0:D=0:!&84=B%
1700 A$="XXXXXXXXXX":A$="":*OPT 1,1
1710 ENDPROC
1720 :
1730 DEF PROCinter:CLS
1740 REPEAT
1750 INPUT'''"Enter the first frame "F%
1760 INPUT"Enter the last frame "L%
1770 UNTIL F%<L% AND  F%>=0 OR L%>N%
1780 I%=L%-F%
1790 F%=B%+F%*24:L%=B%+L%*24
1800 FOR Q%=0 TO 23
1810 D=(L%?Q%-F%?Q%)/I%:C%=0
1820 FOR W%=F%+24 TO L%-24 STEP 24
1830 C%=C%+1
1840 W%?Q%=F%?Q%+(C%*D)
1850 NEXT W%
1860 NEXT Q%
1870 ENDPROC
1880 :
1890 DEF PROCsave:CLS
1900 REPEAT
1910 INPUT'''"Enter file name";A$
1920 UNTIL LEN(A$)>1 AND LEN(A$)<8
1930 X%=OPENOUT(A$)
1940 PRINT #X%,N%
1950 FOR Q%=B% TO E%+24
1960 BPUT #X%,?Q%
1970 NEXT Q%
```

Continued ▶



```
1980 CLOSE #X%
1990 ENDPROC
2000 :
2010 DEF PROCload:CLS
2020 REPEAT
2030 INPUT'''"Enter file name";A$
2040 UNTIL LEN(A$)>1 AND LEN(A$)<8
2050 X%=OPENIN(A$)
2060 INPUT #X%,N%:E%=B%+N%*24
2070 FOR Q%=B% TO E%+24
2080 ?Q%=BGET #X%
2090 NEXT Q%
2100 CLOSE #X%
2110 ENDPROC
2120 :
2130 DEF PROCcopy:CLS
2140 REPEAT
2150 PRINT'''"Source sequence :"
2160 INPUT'"First frame:",F%
2170 INPUT"Last frame :",L%
2180 D%=L%-F%
2190 UNTIL F%>=0 OR F%<L%
2200 INPUT''"Enter first frame"'"of object sequence",J%
2210 K%=J%+D%:IF J%<L% GOTO 2160
2220 IF B%+K%*24>(HIMEM-24) PRINT"NO ROOM!":GOTO 2030
2230 IF N%<K% N%=K%:E%=B%+K%*24
2240 J%=B%+J%*24:C%=24:F%=B%+F%*24
2250 INPUT''"Reverse? (Y/N)";A$
2260 IF FNcaps(A$)=89 C%=-24 : F%=B%+L%*24
2270 FOR Q%=0 TO D%
2280 FOR W%=0 TO 23
2290 J%?W%=F%?W%
2300 NEXT W%
2310 F%=F%+C%:J%=J%+24
2320 NEXT Q%
2330 ENDPROC
2340 :
2350 DEF PROCtop
2360 FOR W%=E% TO P% STEP 24
2370 FOR Q%=0 TO 23
2380 W%?Q%=E%?(Q%-24)
2390 NEXT Q%
2400 NEXT W%
2410 E%=P%:N%=M%
2420 ENDPROC
2430 :
2440 DEF PROCsame:CLS
2450 REPEAT
2460 INPUT'''"Enter source frame";F%
2470 UNTIL  F%>=0 AND F%<N%
2480 F%=B%+F%*24
2490 FOR Q%=0 TO 23
2500 P%?Q%=F%?Q%
2510 NEXT Q%
2520 ENDPROC
2530 :
2540 DEF PROClimb
2550 REPEAT
2560 INPUT'''"Enter new limb to be moved";S%
2570 UNTIL S%>=0 AND S%<12
2580 ENDPROC
2590 :
2600 DEF FNcaps(A$)=ASC(A$) AND &DF
2610 :
2620 REM Display order
2630 DATA 100,0,2,4,6,8,10,6,12,14
2640 DATA 100,6,16,18,100,4,20,22
2650 :
2660 REM Limb co-ords
2670 DATA 450,000,450,150,500,200
2680 DATA 500,400,450,500,550,500
2690 DATA 600,350,500,250,400,350
2700 DATA 500,250,550,150,550,000
2710 :
2720 REM ERROR HANDLER
2730 IF ERR=17 AND G%<>0 PROCmenu
2740 IF ERR=17 CLS : END
2750 REPORT:PRINT ERL
```



See 'Capital Routine', page 77

Listing 1. The source code for the routine to turn capital letters on and off

```
10 REM Capitals
20 REM by Pete Gaunt
30 REM for BBC and Electron
40 REM (c) Acorn User May 1985
50 :
60 store=&74:on=&75
70 bufvec=&22A
80 oldbufvec=&230
90 uservec=&200
100 osbyte=&FFF4
110 code=&A00
120 FOR opt=0 TO 2 STEP2
130 P%=code
140 [OPT opt
150 .init
160 LDA #command MOD &100
170 STA uservec
180 LDA #command DIV &100
190 STA uservec+1
200 LDA #0
210 STA on
220 RTS
230 .command
240 BNE end_com
250 CPX#1
260 BNE com2
270 JSR caps_on
280 JMP end_com
290 .com2
300 CPX#0
310 BNE end_com
320 JSR caps_off
330 .end_com
340 RTS
350 .caps_on
360 LDA on
370 BNE end_on
380 LDA bufvec
390 STA oldbufvec
400 LDA bufvec+1
410 STA oldbufvec+1
420 LDA #check MOD &100
430 STA bufvec
440 LDA #check DIV &100
450 STA bufvec+1
460 LDA #1
470 STA on
480 .end_on
490 RTS
500 .caps_off
510 LDA on
520 BEQ end_off
530 LDA oldbufvec
540 STA bufvec
550 LDA oldbufvec+1
560 STA bufvec+1
570 LDA #0
580 STA on
590 .end_off
600 RTS
610 .check
620 STA store
630 PHP:PHA:TXA:PHA:TYA:PHA
640 CPX#0
650 BNE no_change
660 LDA store
670 CMP#ASC"a"
680 BCC no_change
690 CMP#ASC"z"+1
700 BCS no_change
710 EOR#32
720 STA store
730 PLA:TAY:PLA:TAX:PLA:PLP
740 LDAstore
750 .exit
760 JMP(oldbufvec)
770 .no_change
780 PLA:TAY:PLA:TAX:PLA:PLP
790 JMPexit
800 ]
810 NEXT
```

PROGRAM POINTS 1

Listing 1 provides the source code for the routine to turn capital letters 'on' and 'off', avoiding the CAPS LOCK problem. The machine code assembles into the cassette /RS423 input buffer at &A00. Subsequent use of tape or serial port will destroy the code. It can of course be loaded into another area, such as the user definable character buffer at &C00. The assembled code can be saved using

*SAVE CAPS A00+85 (or &C00+85 if relocated)

Capitals can be turned on and off in the following ways:

Capitals on: *CODE 1 or *FX136,1
Capitals off: *CODE 0 or *FX136,0

If you append this listing onto your main program rather than *LOADing in the machine code then do remember to initialise it by adding a line,

CALL init

before using *CODE or *FX136

If you wish to adapt the program, the following lines will be of interest to you:

Line 160: set user vector to point to "command" routine
Line 230: direct command depending on setting of X
Line 240: A=0 if command is *CODE. If not then no action
Line 270: If X=1 turn caps on
Line 320: If X=0 turn caps off
Line 360: Check if routine already in operation
Line 380: Save default vector
Line 420: Set vector to point to check
Line 470: Set 'on-flag' to 1
Line 510: check if already off
Line 530: restore default vector
Line 580: set 'on-flag' to 1
Line 620: character to be inserted is in A – store temporarily
Line 640: check that character is destined for keyboard buffer (X=0)
Line 710: If lower case convert to upper case
Line 740: load A with new character

Listing 2. Converts lower case letters in a Basic string to upper case

```
10 REM Upper Case
20 REM by Pete Gaunt
30 REM for BBC and Electron
40 REM (c) Acorn User May 1985
50 :
60 MODE3
70 PROCupper_case
80 :
90 REM Test routine
100 REPEAT
110 INPUTLINE''"Enter test string"'test$
120 CALL upper_case,test$
130 PRINT'test$
140 UNTIL FALSE
150 :
160 DEFPROCupper_case
170 upper_case=&A90
180 block=&70:string=&72:par=&600
190 FOR opt=0 TO 2 STEP2
200 P%=upper_case
210 [OPT opt
220 LDA par+1
230 STA block
240 LDA par+2
250 STA block+1
260 LDY #0
270 LDA (block),Y
280 STA string
290 INY
300 LDA (block),Y
310 STA string+1
320 INY
330 INY
340 LDA (block),Y
350 TAY
360 BEQ exit
370 .loop
380 DEY
390 LDA (string),Y
400 CMP #ASC"a"
410 BCC next
420 CMP #ASC"z"+1
430 BCS next
440 EOR #32
450 STA (string),Y
460 .next
470 CPY #0
480 BNE loop
490 .exit
500 RTS
510 ]
520 NEXT
530 ENDPROC
```

PROGRAM POINTS 2

Listing 2 is the routine to convert lower case letters in a Basic string into upper case letters. To use it just enter:

CALL upper_case, X$

where X$ (or any other you care to specify) contains the string to be converted.

The listing provides the source code which assembles its machine code from &A90 – above the listing 1 code. Again it's possible to relocate this to suit if you need to.

To save the machine code use:

*SAVE UPPER A90 + 30

The following program details may be of use to you:

Line 220: get address of the string information block from the parameter block and store in zero page at "block"
Line 270: get address of string from the string information block and store in zero page at "string"
Line 340: get length of string from information block and transfer to Y
Line 360: if null string then exit
Line 370: work down the string from the end
Line 390: load character into A
Line 410: if less than "a" then it's not lower case
Line 430: if greater than "z" then it's not lower case
Line 440: if lower case then convert to upper case
Line 450: store it in place of original character
Line 480: if it's not the start of the string then check the next character else exit the routine

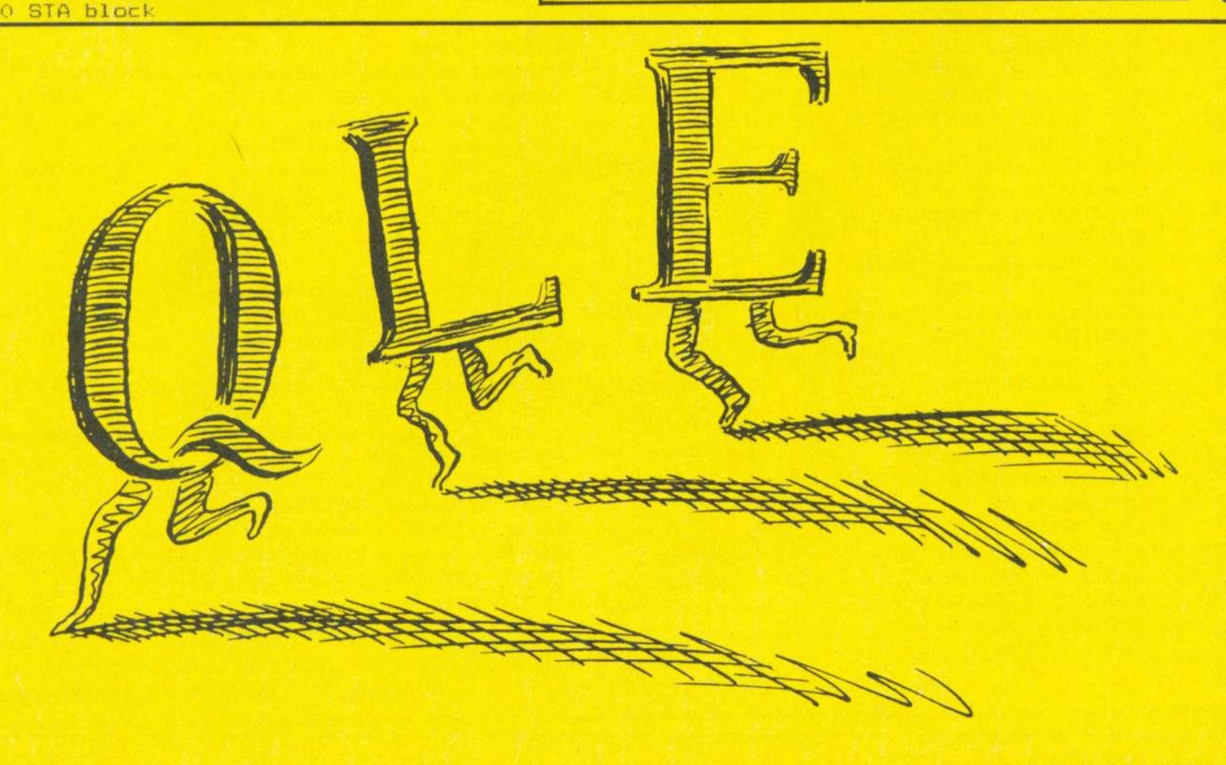
Listing 3. A demonstration of the routine

```
 10 REM Demonstration Program
 20 REM by Pete Gaunt
 30 REM for BBC and Electron
 40 REM (c) Acorn User May 1985
 50 :
 60 MODE3
 70 PROCupper_case
 80 REM If loading code miss out
 90 REM above line and remove the
100 REM folloing two REM's to leave
110 REM the commands to be executed
120 REM *LOAD UPPER
130 REM upper_case=&A90
140 :
150 items%=10
160 DIM word$(items%)
170 FOR N%=1 TO items%
180 PRINT;"Word no. ";N%". ";
190 INPUTLINEword$(N%)
200 NEXT
210 :
220 FOR J%=0 TO items%-1
230 K%=J%+1
240 FOR I%=K% TO items%
250 L%=items%+K%-I%
260 w1$=word$(L%):w2$=word$(J%)
270 CALL upper_case,w1$:CALL upper_case,w2$
280 IF w1$<=w2$ t$=word$(L%):word$(L%)=word$(J%):word$(J%)=t$
290 NEXT
300 NEXT
310 :
320 PRINT''"Sorted...."'
330 FOR N%=1 TO items%
340 PRINTword$(N%)
350 NEXT
360 END
370 :
380 DEFPROCupper_case
390 DIM upper_case 50
400 block=&70:string=&72:par=&600
410 FOR opt=0 TO 2 STEP2
420 P%=upper_case
430 [OPT opt
440 LDA par+1
450 STA block
460 LDA par+2
470 STA block+1
480 LDY #0
490 LDA (block),Y
500 STA string
510 INY
520 LDA (block),Y
530 STA string+1
540 INY
550 INY
560 LDA (block),Y
570 TAY
580 BEQ exit
590 .loop
600 DEY
610 LDA (string),Y
620 CMP #ASC"a"
630 BCC next
640 CMP #ASC"z"+1
650 BCS next
660 EOR #32
670 STA (string),Y
680 .next
690 CPY #0
700 BNE loop
710 .exit
720 RTS
730 ]
740 NEXT
750 ENDPROC
```

PROGRAM POINTS 3

Listing 3 contains the PROCupper_case coding once again. If you have already entered and saved the machine code generated by listing 2 you can leave out the lines from 370 onwards. However you will need to have the machine code on the same disc or present directly after listing 3 on the cassette tape. If you use the machine code method you should also delete line 70 and enter lines 120 and 130 as commands and not REMs thus:

```
120 *LOAD UPPER
130 upper_case = &A90
```



See 'A Change of Mode', page 81

Listing 1. Tristram Mabbs' program allows you to have more than one mode on screen at a time

```
10 REM Modes by interrupts
20 REM By Tristram Mabbs
30 REM For BBC Micro
40 REM (C) Acorn User May 1985
50 :
60 Mode=0
70 DIM DLIs 15,DefCols 21
80 Line_Val=&260
90 :
100 REM Set up a demonstration
110 FOR A=0 TO 8+3*ABS(Mode<4) STEP 3
120 A!DLIs=6*Line_Val:?(A+DLIs+2)=(A/3)+4*ABS(Mode>3)
130 NEXT A
140 A!DLIs=TRUE
150 RESTORE 330
160 FOR A=0 TO 21
170 READ DefCols?A
180 NEXT A
190 MODE Mode
200 :
210 REM This PROC does the work
220 PROCsetdlis(DLIs,DefCols)
230 PROCmode(0)
240 PROCtextdemo
250 PROCmode(1)
260 PROCtextdemo2
270 PROCmode(2)
280 PROCcubesdemo
290 PROCmode(3)
300 PROCtextdemo3
310 END
320 REM Data default colours
330 DATA0,7,0,1,3,7,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
340 :
350 DEF PROCmode(mode)
360 REM Fool MOS-"This is a mode!"
370 A%=174:X%=0:Y%=&FF
380 vduvars=(USR(&FFF4)AND&FFFF00)/256
390 RESTORE (1000+mode*10)
400 READ value
410 vduvars?&0A=value
420 READ value
430 vduvars?&4F=value
440 READ value
450 vduvars?&52=value
460 READ value
470 vduvars?&53=value
480 READ value
490 vduvars?&55=value
500 READ value
510 vduvars?&60=value
520 READ value
530 vduvars?&61=value
540 READ value
550 vduvars?&62=value
560 READ value
570 vduvars?&63=value
580 ENDPROC
585 :
590 DEF PROCtextdemo
600 FOR A=1 TO 7
610 PRINT"This is MODE 0"
620 NEXT A
630 PRINT
640 ENDPROC
645 :
650 DEF PROCtextdemo2
660 FOR A=1 TO 6
670 COLOUR A
680 PRINT"This is MODE 1"
690 NEXT A
700 ENDPROC
705 :
710 DEF PROCcubesdemo
720 FOR A=1 TO 10
730 X=RND(1280):Y=RND(128)+320
740 GCOL 0,(A*3)
750 PLOT 69,X,Y
760 PLOT 69,X+40,Y
770 PLOT 85,X,Y+40
780 PLOT 69,X+40,Y
790 PLOT 85,X+40,Y+40
800 GCOL 0,(A*3)+1
810 PLOT 69,X,Y+40
820 PLOT 85,X+60,Y+60
830 PLOT 85,X+20,Y+60
840 GCOL 0,(A*3)+2
850 PLOT 69,X+40,Y+40
860 PLOT 69,X+60,Y+60
870 PLOT 85,X+40,Y
880 PLOT 85,X+60,Y+20
890 NEXT A
900 COLOUR 7
910 PRINT''"Mode 2...."
920 ENDPROC
925 :
930 DEF PROCtextdemo3
940 VDU31,0,25
950 COLOUR 1
960 FOR A=1 TO 6
970 PRINT"This is MODE 3"
980 NEXT A
990 ENDPROC
995 :
1000 DATA 79,8,&80,2,0,1,7,&80,1
1010 DATA 39,&10,&80,2,1,3,3,&88,&11
1020 DATA 19,&20,&80,2,2,&F,1,&AA,&55
1030 DATA 79,8,&80,2,3,1,0,128,1
1040 DATA 39,8,&40,1,4,1,7,128,1
1050 DATA 19,&10,&40,1,5,3,3,&88,&11
1060 DATA 39,8,&40,1,6,1,0,128,1
1070 :
10000 DEF PROCsetdlis(Data1,Data2)
10010 *FX9
10020 *FX10
10030 DIM Code FNassemble(0,&C000)
10040 A=FNassemble(0,Code)
10050 A=FNassemble(2,Code)
10060 A=?Data1+&C8:?Data1=A
10070 Data1?1=((Data1?1)+((A AND&F00)/&100)+6)
10080 CALL Vec_Setup
10090 ENDPROC
10095 :
10100 DEF FNassemble(Pass,Adr)
10110 P%=Adr:[OPT Pass
10120 \ Change IRQ1 vector
10130 .Vec_Setup SEI
10140 LDA&204:STA OldIrq:LDA&205:STA OldIrq+1
10150 LDA#NewIrq AND&FF:STA&204:LDA#NewIrq/256:STA&205
10160 CLI:RTS
10170 .OldIrq BRK:BRK
10180 \ New interrupt routine
10190 .NewIrq LDA&FC:PHA:TXA:PHA:TYA:PHA
10200 LDA&FE4D:AND&FE4E:AND#&20
10210 BNE DLI
10220 LDA&FE4D:AND&FE4E:AND#2
10230 BNE FSI
```

Continued ▶

◀ Continued

```
10240 .Irq_Exit PLA:TAY:PLA:TAX:PLA:STA&
FC:JMP(OldIrq)
10250 \ Interrupts identified
10260 .FSI LDA&FE4E:AND#&20:BEQ Irq_Exit
10270 LDA#0:STA ModeCount
10280 \ DLI routine
10290 .DLI STA&FE4D
10300 LDX ModeCount
10310 LDA Data1+2,X:BMI Timer:TAY
10320 LDA ULAdat,Y:STA&FE20
10330 LDA Cols,Y
10340 CMP#2:BNE CN2:\two colour modes
10350 LDY#0:.C2_1
10360 LDA Data2,Y:EOR#7:ORA Col2base,Y
10370 LDX#7:.C2_2
10380 STA&FE21:CLC:ADC#&10
10390 DEX:BPL C2_2
10400 INY:CPY#2:BNE C2_1
10410 BEQ Timer
10420 .CN2 CMP#4:BNE CN4:\ 4 colour mode
s
10430 LDY#0:.C4_1
10440 LDA Data2+2,Y:EOR#7:ORA Col4base,Y
10450 STA&FE21:CLC:ADC#&10
10460 STA&FE21:CLC:ADC#&30
10470 STA&FE21:CLC:ADC#&10
10480 STA&FE21
10490 INY:CPY#4:BNE C4_1
10500 BEQ Timer
10510 .CN4 \sixteen colour mode
10520 LDY#0:.C16_1
10530 LDA Data2+6,Y:EOR#7:STA Col16base
10540 TYA:ASLA:ASLA:ASLA:ASLA
10550 ORA Col16base
10560 STA&FE21
10570 INY:CPY#16:BNE C16_1
10580 .Timer
10590 LDA&FE4B:AND#&DF:STA&FE4B
10600 LDX ModeCount
10610 LDA Data1,X:STA&FE48:INX:LDA Data1
,X:STA&FE49
10620 INX:INX:STX ModeCount
10630 LDA#&A0:STA&FE4D:STA&FE4E
10640 JMP Irq_Exit
10650 \ Assorted data
10660 .ModeCount BRK
10670 .Col2base :]:?P%=0:P%?1=&80:P%=P%+
2:[OPT Pass
10680 .Col4base :]:!P%=&A0802000:P%=P%+4
:[OPT Pass
10690 .Col16base BRK
10700 .ULAdat :]:!P%=&9CF4D89C:P%!4=&88C
488:P%=P%+7:[OPT Pass
10710 .Cols :]:!P%=&2100402:P%!4=&20402:
P%=P%+7:[OPT Pass
10720 ]:=P%-Adr
10725 :
10730 DEF PROCdlisoff
10740 ?&FE4E=&20:ENDPROC
10745 :
10750 DEF PROCdlison
10760 ?&FE4E=&A0:ENDPROC
```




IF KEYING in all these listings gets you down and your fingers in a tangle why not send off for our monthly listings cassette?

It contains all the major programs in this issue and costs £3.75 including postage and packing. You'll find the details about the cassette and the order form on page 96.

Better still, be the envy of your friends and buy a bar-code reader (see our offer on page 113). All the listings in these yellow pages are reproduced in bar code format – send a cheque or postal order for £1.60 plus an A4 sized stamped addressed envelope to Bar Code Listings (May), Acorn User, 68 Long Acre, London WC2E 9JH.

See 'Beeb Forum', page 115

Listing 1. C M Ferrington's cursor move routine to use with Colfill

```
   1 REM Cursor Procedures
   2 REM by C M Ferrington
   3 REM Beeb Forum
   4 REM (c) Acorn User May 1985
   5 :
   6 DIM B% 15,K%(15)
  41 VDU23,240,32,32,248,32,32,0,0,0
  45 VDU23,241,248,248,248,248,248,0,0,0
5000 DEFPROC_Cursor(X%,Y%)
5002 :
5004 REM  ADJUST X% AND Y% SO THAT CENTR
E OF CURSOR IS AT TRUE GRAPHICS
5006 REM  COORDINATES.
5008 :
5020  LOCAL I%,X1%,X2%
5030 X%=X%-8:Y%=Y%+8
5032 :
5034 REM  FIND ADDRESS OF BLOCK OF SCREE
N MEMORY
5036 :
5040 M%=&3000+(31-(Y% DIV 32))*640+(X% D
IV 16)*8+(255-(Y% DIV 4))MOD 8
5042 :
5044 REM  SAVE BLOCK OF MEMORY INTO B%
5046 REM  SAVE ADDRESSES INTO K%()
5048 :
5050 X1%=M% DIV 8
5060 FORI%=0TO4:X2%=M%+I%
5070 IF (X2% DIV 8)>X1% X2%=X2%+632
5080 B%?I%=X2%?0:B%?(I%+8)=X2%?8
5090 K%(I%)=X2%:K%(I%+8)=X2%+8
5100 NEXT
5102 :
5104 REM  SET BLOCK OF SCREEN TO BACKGRO
UND AND PRINT +
5106 :
5110 VDU5,18,0,0,25,4,X%;Y%;241,18,0,2,8
,240,4
5120 ENDPROC
5130 DEFPROC_Wipe
5132 :
5134 REM  USE ADDRESSES IN K%() AND VALU
ES IN B% TO RESTORE SCREEN MEMORY
5136 :
5140 ?(K%(0))=B%?0:?(K%(8))=B%?8
5150 ?(K%(1))=B%?1:?(K%(9))=B%?9
5160 ?(K%(2))=B%?2:?(K%(10))=B%?10
5170 ?(K%(3))=B%?3:?(K%(11))=B%?11
5180 ?(K%(4))=B%?4:?(K%(12))=B%?12
5190 ENDPROC
```


Listing 2. Demonstration of the cursor move program

```
   1 REM Cursor Demonstration
   2 REM by C M Ferrington
   3 REM Beeb Forum
   4 REM (c) Acorn User May 1985
   5 :
   6 DIM B% 15,K%(15)
  10 *LOAD "COLFILL" 1200
  12 Cfill=&1200
  20 *TV0,1
  40 MODE1:*FX4,1
  41 VDU23,240,32,32,248,32,32,0,0,0
  42 VDU24,0;0;1279;950;
  43 VDU28,0,0,39,1
  44 VDU23;8202;0;0;0;
  45 VDU23,241,248,248,248,248,248,0,0,0
  50 *LOAD "SHADES" 3000
  60 X%=640:Y%=512
 200 PRINT"CURSOR DEMO -   USE CURSOR KE
YS TO MOVE"
 202 PRINT"SHIFT=FAST  -   CTRL=FASTER
 -   Q=QUIT";
 210 PROC_Cursor(X%,Y%)
 212 REPEAT:REPEAT
 214 L=INKEY(-26)*4:R=INKEY(-122)*4:U=IN
KEY(-58)*4:D=INKEY(-42)*4:Q=INKEY(-17)
 215 FAST=INKEY(-1):FASTER=INKEY(-2)
 216 UNTIL L+R+U+D+Q<>0
 220 IF L+R+U+D<>0 PROC_Wipe
 222 F1=1:IF FAST F1=4
 224 F2=1:IF FASTER F2=8
 230 X%=X%+L*F1*F2-R*F1*F2:Y%=Y%+D*F1*F2
-U*F1*F2
 232 IF X%<8 X%=8
 234 IF X%>1263 X%=1263
 236 IF Y%<8 Y%=8
 238 IF Y%>1000 Y%=1000
 240 PROC_Wait(5)
 242 PROC_Cursor(X%,Y%)
 250 UNTIL Q=-1
 252 *FX21,0
 260 MODE3:*FX4,0
 270 END
5000 DEFPROC_Cursor(X%,Y%)
5020 LOCAL I%
5030 X%=X%-8:Y%=Y%+8
5040 M%=&3000+(31-(Y% DIV 32))*640+(X% D
IV 16)*8+(255-(Y% DIV 4))MOD 8
5050 X1%=M% DIV 8
5060 FORI%=0TO4:X2%=M%+I%
5070 IF (X2% DIV 8)>X1% X2%=X2%+632
5080 B%?I%=X2%?0:B%?(I%+8)=X2%?8
5090 K%(I%)=X2%:K%(I%+8)=X2%+8
5100 NEXT
5110 VDU5,18,0,0,25,4,X%;Y%;241,18,0,2,8
,240,4
5120 ENDPROC
5130 DEFPROC_Wipe
5140 ?(K%(0))=B%?0:?(K%(8))=B%?8
5150 ?(K%(1))=B%?1:?(K%(9))=B%?9
5160 ?(K%(2))=B%?2:?(K%(10))=B%?10
5170 ?(K%(3))=B%?3:?(K%(11))=B%?11
5180 ?(K%(4))=B%?4:?(K%(12))=B%?12
5190 ENDPROC
7000 DEFPROC_Wait(t)
7002 TIME=0:REPEAT UNTIL TIME=t
7004 ENDPROC
```

Listing 4. This program from Neil MacFadyen allows you to time machine code

```
10 REM Machine Code Timer
20 REM by Neil McFadyen
30 REM For BBC micro
40 REM (c) Acorn User March 1985
50 *K.1 PA.=&E00|MOLD|M
60 *K.0 PA.=&6600|MPROCevaluate|MPA.=&E00|M
70 PROCassemble:PROCprint
80 PRINT"Press f1 to return to main program":END
90 DEFPROCassemble:VDU15
100 divtime%=&80:modtime%=&81:vectsto%=&83
110 timer1%=&FE64:IRQ2V=&206
120 ifr%=&FE6D:ier%=&FE6E:acr%=&FE6B
130 FOR I%=0TO3STEP3
140 P%=&A00
150 [OPTI%
160 .staco%
170 PHP:PHA:TXA:PHA:TYA:PHA
180 LDA#0:STA divtime%
190 LDA #&40:ORA acr%:STA acr%
200 LDA #&C0:ORA ifr%:STA ifr%
210 LDA #&C0:ORA ier%:STA ier%
220 LDA IRQ2V:STA vectsto%
230 LDA IRQ2V+1:STA vectsto%+1
240 SEI:LDA#irco% MOD256:STA IRQ2V
250 LDA#irco% DIV256:STA IRQ2V+1:CLI
260 LDA #&FF:STA timer1%:STA timer1%+1
270 JMP end%
280 .irco%
290 LDA&FC:PHA:TXA:PHA:TYA:PHA
300 LDA ifr%:AND#&C0:CMP#&C0:BNEex
310 STAifr%:LDX divtime%:INX:STX divtime%
320 .ex
330 PLA:TAY:PLA:TAX:PLA:STA&FC
340 JMP(vectsto%)
350 .stopco%
360 PHP:PHA:TXA:PHA:TYA:PHA
370 SEI:LDA timer1%:LDX timer1%+1:CLI
380 CMP#3:BCS no_adj
390 INX
400 .no_adj
410 LDY#64:STY ier%
420 STA modtime%:STX modtime%+1
430 LDA vectsto%:LDX vectsto%+1
440 SEI:STA IRQ2V:STX IRQ2V+1:CLI
450 .end%
460 PLA:TAY:PLA:TAX:PLA:PLP:RTS
470 ]NEXT
480 ENDPROC
490 DEFPROCprint
500 PRINT"timeron = &";~staco%
510 PRINT"timeroff= &";~stopco%
520 ENDPROC
530 DEFPROCevaluate
540 fact1%=29:fact2%=100
550 modtime%=&81:divtime%=&80
560 divno%=(&10000-fact2%)*?divtime%
570 modno%=&10000-?(modtime%+1)*&100-?modtime%-fact1%
580 PRINTTAB(15)"No. of cycles = ";(modno%+divno%)*2
590 PRINTTAB(15)"======================":ENDPROC
```

Listing 3. Alex Whitfield's enhancements to January's automatic disc file update

```
10*KEY2Q=PA.+87:?Q=?Q+1:Q%=&B00+?&B02:Q%?77=?Q|M:Q%=&B00+?&B03:Q%?13=?Q|MSA."I.PROGst5"|M
20*KEY3LO."I.PROGst2"|M
```

Listing 5. Produce 256 colours on screen in mode 2 with D Litvin's routine

```
10 REM 256 Colours
20 REM Beeb Forum
30 REM (c) Acorn User May 1985
40 :
50 B=0
60 REPEAT
70 MODE 2
80 FOR I=1 TO 1024 STEP 113
90 MOVE 0,I:DRAW 1280,I
100 NEXT
110 FOR I=1 TO 1280 STEP 142
120 MOVE I,0 :DRAW I,1024:NEXT
130 FOR I=0 TO 1024 STEP 113
140 FOR Z=0 TO 1280 STEP 142
150 FOR P=(Z+8) TO (Z+134) STEP 4
160 ?&359=B
170 MOVE P,(I+8):DRAW P,(I+105)
180 NEXT P
190 B=B+1
200 NEXT
210 NEXT
220 A=GET
230 CLS
240 B=B+64
250 UNTIL 0
```

Listing 6. Miranda Williams' Wordwise pager

```
10 REM Wordwise Pager
20 REM For BBC Micro with Wordwise
30 REM by Miranda Williams
40 REM (c) Acorn User March  1985
50 MODE 7
60 oscli=&FFF7
70 DIM command 30
80 CLOSE #0
90 INPUT ''"Type in the filename. "F$
100 ch=OPENUP F$
110 IF ch=0 THEN PRINT CHR$(133);"File ";F$" does not exist!":CLOSE #ch:STOP
120 lines=0:nopages=0
130 CLS
140 REPEAT
150 nopages=nopages+1
160 CLS
170 REPEAT
180 Z=BGET#ch
190 IF Z=13 THEN lines=lines+1
200 IF Z=13 AND lines<>25 THEN VDU10,13 ELSE IF Z>31 VDU Z
210 UNTIL EOF#ch OR lines=25
220 lines=0
230 PROCOSCLI ("SAVE PAGE"+STR$nopages+" 7C00 +400")
240 UNTIL EOF#ch
250 CLS
260 CLOSE #0
270 PRINT''CHR$131"JOB DONE"''" ";
280 END
290 :
300 DEF PROCOSCLI($command)
310 X%=command MOD 256
320 Y%=command DIV 256
330 CALL oscli
340 ENDPROC
```

See 'High Voltage', page 119

Listing 1. Paul Beverley's program to set up a voltmeter using the ADC

```
   10REM Voltmeter program
   15REM by Paul Beverley
   20REM For BBC and Electron/Plus-1
   25REM (c) Acorn User - May 1985
   30:
   40scalefactor=1570.8:REM if you already
 know it.
   50MODE 7
   60PROCinitialise
   70REPEAT
   80V=FNreadADC/scalefactor
   90PRINT TAB(14,10) CHR$(141);V;" "
  100PRINT TAB(14,11) CHR$(141);V;" "
  110IF M%=77 PRINT TAB(W%,22);V;" ":W%=W%
+10
  120W%=W% MOD 40
  130M%=INKEY(0)
  140IF M%>127 PROCchange
  150UNTIL M%=13
  160MODE7
  170@%=10
  180*FX225,1
  190END
  200:
  210DEF FNreadADC
  220total%=0
  230FOR N%=1 TO samples%
  240REPEAT UNTIL ADVAL0DIV256=1
  250total%=total%+ADVAL1
  260NEXT
  270IF ADVAL1>65500 SOUND 1,-15,200,20
  280=total%/samples%
  290:
  300DEF PROCinitialise
  310*FX16,1
  320*FX225,128
  330PRINT"Put probes across known pd"'
  340PRINT"and enter the value of the volt
age."'
  350PRINT"or press return to continue"'
  360INPUT; Vref
  370samples%=64
  380IF Vref>0 scalefactor=FNreadADC/Vref
  390samples%=16
  400CLS
  410VDU23;8202;0;0;0;
  420PRINT TAB(15,8)"VOLTS"
  430PRINT TAB(1,20)"MEM 1","MEM 2","MEM 3
","MEM 4"
  440PRINT TAB(5,16)"PRESS 'M' TO STORE RE
ADING"
  450@%=&2020A
  460W%=1
  470ENDPROC
  480:
  490DEF PROCchange
  500IF M%=128 samples%=samples%*2
  510IF M%=129 samples%=samples%/2
  520IF samples%=2 samples%=4
  530ENDPROC
```

```
 10  REM ZYLEK DLP EYJK DATXE EZI JMTAK
 20  REM LTE YL DLR TMPIM
 30  REM KTHIEZYLB LTE BXDMDLEIIP ZIMI
 40  REM DFTML STL TN FTXMKI
 50  REM KRHJZTLYF ZDMHTLR
 60  REM PDLYKZ JMYLFI SYEZ D HYFMT HDRAI
 70  REM ZIV STMPK BYQI PIFYHDO DLKSIM
 80  REM EZIR DMI LTE DOO MIP
 90  REM KEMYJ TNN EZI DHJIMKDLP DLP EMIDE
     SZDE RTX DMI OINE SYEZ DK D PIFYHDO
100  REM EZYK JXUUOI KIEEIM PTIK LTE OYGI
     YLGIR AIYLB KT LIBDEYQI D NTMFI
```

```
 10 REM HOW TO GET THE ANSWER
 20 TOTAL - 0
 30 LET TOTAL - TOTAL;ANNE
 40 LET TOTAL - TOTAL:GOALS
 50 LET TOTAL - TOTAL;PRIMEANSWER = XSUMANSWER
 60 LET TOTAL - TOTAL = DANISHPROBLEM
 70 LET TOTAL - TOTAL:(INKEY?MORSE)
 80 LET TOTAL - TOTAL = HEXWORDSUM
 90 LET TOTAL - TOTAL;FORMAT = UNSCRAMBLEDRATE
100 LET TOTAL - TOTAL:MUSICANSWER
110 LET TOTAL - TOTAL = YEARCHARLESBABBAGEDIED
120 PRINTTOTAL:REM BEST PRINT ON A POSTCARD
130 REM CLAIM PRIZE!
```

TOP OF THE LIST

GRAHAM JONES from Blackburn was spurred into supplying this month's Top of the List after seeing a program in Beeb Forum, and it earns him £25. Graham's program is a sound compiler – a program that converts a series of sound commands into a machine code usable form. The sound sequences are provided by a Basic program, caught as they are produced by the micro and stored within memory. You certainly do not need to be a machine code programmer to use the program, in fact if you have never dabbled at machine code before this would be a very good time to start. Just enter the listing as you see it and run it!

For the more technically minded reader the program works by intercepting the OSWORD vector and passing all OSWORD based calls into the machine code routine called 'neword'. Sound is produced using an OSWORD call with the accumulator containing the number 7. When an OSWORD call is issued by the MOS it is directed to the machine code here which then tests to see if the accumulator does contain 7. If it does then the command is a SOUND command – if it is not, then the call is handed back to the micro's normal OSWORD handling routine. If the call is a sound-producing one, then the eight byte parameter block used by the OSWORD call is stored in the eight bytes of memory pointed to by 'block%'. This storage of sound data continues until either the storage memory is filled or the sound generating program ends.

Using the sound compiler is extremely easy, as the listing shows. Lines 100 to 750 should be included in your own program. All you need do is to add the line:

```
PROCassemble
```

at the start of your program and the line:

```
CALL intercept
```

before any sound commands are issued. The sound command should be terminated by the line:

```
CALL restore.
```

When the sound program is RUN the compiler will store the commands at &3000. This location can be changed to suit your needs by adjusting the value assigned to 'block%' in line 130. This is the memory used by the high resolution screen modes, so changing mode after compiling your sound is not advised!

To play back the routine from Basic, the integer variables X% and Y% point to the start address of the sound data, as specified by block%. This is best done using:

```
X% = block% MOD 256
Y% = block% DIV 256
```

The sound can then be played with the command:

```
CALL sound
```

Playing back the sound from within assembler is executed in a similar vein. The index registers should point to the start of the sound data, which is played with the command:

```
JSR sound
```

Once the sound has been compiled it can, of course, be saved as a block of memory. To do this you need to know its start and end address. The start address is found by knowing the values assigned to block% as defined in line 130. The end address is found by typing:

```
PRINT ~(!&82 AND &FFFF) + 2
```

If the start and end addresses were &3000 and &3200 respectively, the save command would be:

```
*SAVE  SDATA  3000  3200
```

Using this method, libraries of sound data could be compiled. For the real machine code buffs, the sound compiler coding could be saved with the sound data itself, which is fully relocatable as it is just data. Obviously the routine will not compile delay loops. If they are required they can be inserted by using a 'blank note', with a duration from 0 to 255. For example the command:

```
SOUND 1,0,0,0
```

would produce a small pause between two sounds on channel 1.

TOP OF THE LIST

```
10 REM Sound Compiler
20 REM By Graham M Jones
30 REM For BBC  & Electron
40 REM (c) Acorn User May 1985
50 :
60 PROCassemble
70 PROCdemo
80 END
90 :
100 DEF PROCassemble
110 :
120 DIM code% 160
130 block%=&3000
140 OSWORD=&FFF1
150 FOR pass%=0 TO 3 STEP 3
160 P%=code%
170 [OPT pass%
180 :
190 .intercept
200 LDA &20C:STA &80
210 LDA &20D:STA &81
220 LDA #(newword MOD 256):STA &20C
230 LDA #(newword DIV 256):STA &20D
240 LDA #(block% MOD 256):STA &82
250 LDA #(block% DIV 256):STA &83
260 RTS
270 :
280 .newword
290 CMP #7:BNE osword
300 PHA:TYA:PHA
310 STX &84:STY &85
320 LDY #0
330 .copypar
340 LDA (&84),Y
350 STA (&82),Y
360 INY
370 CPY #8
380 BNE copypar
390 LDA &82:CLC:ADC #8:STA &82
400 BNE exit
410 INC &83
420 LDA &83:CMP #&80:BEQ stop
430 .exit
440 PLA:TAY:PLA
450 .osword
460 JMP (&80)
470 :
480 .stop
490 PLA:TAY:PLA
500 :
510 .restore
520 PHA:TYA:PHA
530 LDA &80:STA &20C
540 LDA &81:STA &20D
550 LDY #1:LDA #&F0:STA (&82),Y
560 PLA:TAY:PLA
570 RTS
580 :
590 .sound
600 STX &70:STY &71
610 .makesound
620 LDA #7:LDX &70:LDY &71
630 JSR OSWORD
640 LDA &70:CLC:ADC #8:STA &70
650 BNE checkend
660 INC &71
670 .checkend
680 LDY #1:LDA (&70),Y:CMP #&F0
690 BEQ end
700 LDA &71:CMP #&80:BNE makesound
710 .end
720 RTS
730 :
740 ]
750 NEXT pass%
760 :
770 ENDPROC
780 :
790 DEF PROCdemo
800 :
810 CALL intercept
820 FOR I%=0 TO 255 STEP 4
830 SOUND 0,-4,I%,1
840 SOUND 1,-15,I%,1
850 SOUND 2,-15,I%,1
860 SOUND 3,-15,255-I%,1
870 NEXT I%
880 CALL restore
890 :
900 X%=block% MOD 256
910 Y%=block% DIV 256
920 :
930 PRINT'" Press any key ...."'
940 *FX 15,1
950 G%=GET
960 :
970 CALL sound
980 :
990 ENDPROC
```

Wordwise pager, Beeb Forum, page 117

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17




18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33



BAR CODES will revolutionise the way we use computers in applications as well as the way we load data. Here is the chance to get experience of this important development by ordering the Addison Wesley/MEP Bar Code Teaching Pack (see our January issue, page 129) direct through *Acorn User*.

These bar code readers are being offered to schools first and versions will not be available to the public in the shops until later in the year – when they will certainly cost more. However, because of its active involvement in the scheme *Acorn User* is able to offer the Teaching Packs direct to readers at the introductory price of £49.95 plus £2.95 post and packing (plus VAT).

Acorn User will be printing some listings in bar code format in each issue and making booklets of bar codes available by mail order.

Book publishers are already printing listings in bar code format, in fact Bruce Smith's latest book *The BBC Micro Machine Code Portfolio* has 13 pages of bar code listings.

So, to stay ahead of the latest development in computers and education, send off for a pack from *Acorn User* today. *See page 105 for offer of magazine listings in bar code format.*

The pack includes:

★bar code reader
★explanatory booklet written by *Acorn User* author George Hill
★software to print bar codes
★music program by Joe Telford
★bar code stencil
★disc or cassette of utility software

Note to disc users: the disc supplied is 40 track – however, if you order the cassette, there are instructions on how to transfer the software to 40 or 80 track discs.

Please state disc or cassette version.

All for £60.84 including VAT and £2.95 postage, (£52.90 excluding VAT). Make your cheque payable to Redwood Publishing, fill in the form below and send it to Bar Code Offer, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Please send me .... Bar Code Reader Teaching Packs* (£60.84 each inclusive)
please tick for 40 track disc ☐ or cassette ☐

Name ....

Address ....

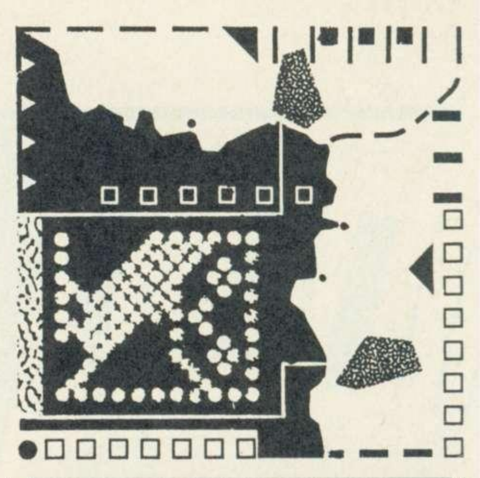
.... Post code ....

☐ I enclose a cheque/PO payable to Redwood Publishing for £.........

Signed ....

Date ....

Send this form with your remittance to Bar Code Offer, Redwood Publishing, 68 Long Acre, London WC2E 9JH.



Readers' tips, edited by Bruce Smith, this month concentrate on how to get the best from your colour graphics

£10 The vanishing cursor

PETER SANDFORD'S two excellent articles on dot and colour filling have caught the imagination of many of you, to judge by your letters and phone calls. C M Ferrington of South Queensferry has supplied a couple of cursor move routines for use with COLFILL (see *AU* January). Mr Ferrington writes: The normal way of plotting and erasing (ie, with GCOL 3) is fine if solid colours are involved, and a cursor so plotted will be visible even though its colour will change depending on the colour it overlays. With colour mixtures, however, the cursor sometimes becomes almost invisible.

It was with this in mind that I wrote the two routines PROC_Cursor and PROC_Wipe (listings 1 and 2). The procedures require the following in the main program:

(1) a block of 16 bytes DIM B%15
(2) an integer array of 16 elements DIM K%(15)
(3) characters 240 and 241 to be redefined:

VDU23,240,32,32,248,32,32,0,0,0
VDU23,241,248,248,248,248,248,0,0,0

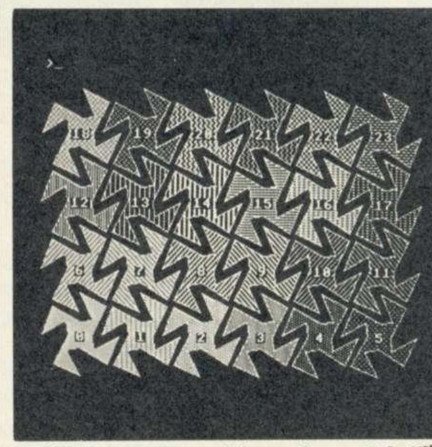
PROC_Cursor(X%,Y%) works by placing the screen memory associated with the point X%,Y% in B%(0-15), then replacing that part of the screen with a cursor *on its own background.* It also fills K% with the addresses of screen memory so replaced.

PROC_Wipe simply replaces the screen memory at X%,Y%, effectively removing the cursor which can then be replotted elsewhere by PROC_Cursor. It is important that the cursor is not 'plotted' outside the screen area, but I have left it up to the calling program to check that this will not happen.

Line 5110 is the cursor output statement:

VDU5 Write characters at graphics cursor
VDU18,0,0 Set colour for 'background' of cursor
VDU25,4,X%;Y%; Move graphics cursor to X%,Y%
VDU241 Output 'background'
VDU18,0,2 Set cursor colour
VDU8 Backspace
VDU240 Output cursor
VDU4 Restore text cursor

The adjustment of −8 and +8 to X% and Y% at line 5030 is needed to ensure that the centre of the cursor is at the graphics position.



Dotfill's 24 patterns – this routine and Colfill have fired your imaginations



Save our updates

ALEC WHITFIELD from Maidenhead has suggested a couple of enhancements to the automatic disc file update presented by Dr Borcherd in the January Forum. Alec writes:

In listing 3 the first (line 10) is to rearrange the order a little. By putting the SAVE command at the end, the version number is incremented before the program is saved. This way, the program does not have to be run twice before the auto-update is effected.

Second (line 20), it is not too difficult to add an auto-update LOAD on another function key.

Mozart = 4; Schubert = 8.5;
Brahms = 4; Beethoven = ?

£5 Escape from the Mouse trap

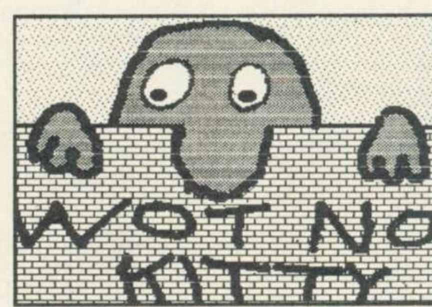
THE AMX Mouse seems to have broken the peripheral barrier with many of you, and become a firm favourite. Gerald Fitton of Swindon, for one, has come up with an interesting way to design his own backgrounds using the icon design program. Gerald explains the technique:

*RUN the AMX *Art* program. Pull down the Options menu and select *COMMAND. Now *SAVE ICONS0 4800+400. This will save all the icons used by the *Art* program. Leave the *Art* program and run the icon *Design* program. Load your ICONS0 in the usual way.

You will find the 32 background textures are in the last eight icons (four textures, one in each quadrant of each icon). Modify these as you please (but don't change the upper left quadrant of icon 31 or you won't have an eraser) and then save them using the *Design* program in the usual way as, say, ICONS1. You will find that each texture is in fact an 8×8 grid of pixels. This gives plenty of scope for variety.

Now press CTRL and Break and do the following:

*LOAD ART
*LOAD ICONS1 4800
*SAVE ART1 1900+3400 1903



You're not tied to backgrounds like these with Gerald Fitton's technique

Beeb Forum listings 1 to 6 are on yellow pages 106–107

You can now *RUN ART1 and it will contain your new 32 background textures, which will be displayed and can be used as the bricks, etc, were before.

If you are an advanced user who wants an alternative text style, I suggest you *SAVE a block of &400 bytes between &4400 and &4800 in the same way and have a look at it!

£10 Beating the clock

IF YOU write machine code for its running speed, you'll obviously be interested in getting some timing results – perhaps of certain subroutines to see where sections of code are not particularly efficient. Neil McFadyen of Birmingham provides just such a timing routine (listing 4) to seek out these stragglers. Neil says . . .

The program utilises the user VIA with timer 1 running continuously. An interrupt is generated when the timer reaches zero and the service routine increments a single-byte counter at location &80. This means that up to 2^{24} cycles can be timed (approximately 17 seconds at the VIA clock rate).

A maximum precision of two cycles is possible as the VIA runs at half the speed of the CPU. Accuracy is lost when timing long routines as the 6502 performs other tasks for the MOS; however, this does not reduce the usefulness of the program.

The code in this version assembles to &A00 and the program should be loaded with PAGE = &6600 in mode 7. On assembly, two addresses are given, one for the routine which starts the count and the other to stop it.

The source code to be tested should be loaded at &E00. It's also helpful to insert the following line at the beginning:

```
timeron = &A00: timeroff = &A65
```

Now, to use the timer, insert the following lines in the source code at the required points:

```
JSR timeron
JSR timeroff
```

Ensure that both these commands are actually processed, otherwise the computer will lock-up.

Run the program and on completion, press f0 for the result.

The variable fact2% was intended to account for the number of cycles added by the program and OS interrupt handlers, but the accuracy after 65000 cycles is not high enough to make the effort estimating it worthwhile.

£5 The key to even more colours

CHIGWELL in Essex evidently has some colourful characters: one of them, D Litvin, has found a way of producing 256 colours in mode 2. Mr Litvin explains: It should be possible to mix two colours on the screen, in order to produce a number of new ones. Memory location &359 holds the current graphics foreground colour. If you type in the following:

```
MODE 2
?&359 = &12
DRAW 1000,1000
```

a line of blue and red dots is plotted. This is because location &359 can store two colours instead of one (it is treated like a byte from mode 2 screen memory). Figure 1 shows how the two colours are stored in &359. So to use cyan and magenta you must type:

```
?&359 = &39
```

B Gabel's article in the November issue has a table showing the number applying to each set of colours. Using this, it should now be quite easy to shade a region with a set of colours, thus making a new colour. This is demonstrated in the program listing 5, which displays some of the possible colours available. For a new set, press any key.

It is possible to change the mode and the program will still work. Even in a two-colour mode, there are a large variety of shades available.

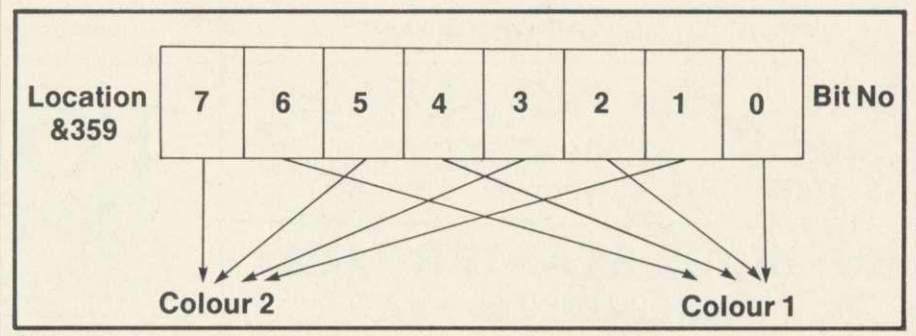


Figure 1. How two colours are stored in &359

£10 Novel Wordwise line-up

A USEFUL program that allows you to type in pages of text in *Wordwise*, and then access them as separate mode 7 pages has been sent in by Miranda Williams of London (listing 6). Colour and double height characters can be added using a suitable Teletext editor.

To use the program:

1) Type in the *Wordwise* text as normal.
2) Set the left margin to LM2 to provide space for the teletext control characters.
3) Set the line length to LL36.
4) Insert any other formatting commands, such as JO for justification and BP to force a new page. For fully formatted text use EP, PL25, PP, DH and DF as you wish.
5) Spool the text using option 8.
6) Load and run the program, supplying the necessary filename.

The file is split into 25-line blocks which are *SAVEd as PAGE1 to PAGEn, with each page being one mode 7 screen. These pages can be loaded in and edited as required. Basic II users can omit the PROC from line 230 and use OSCLI direct. Lines 300 to 340 can also be omitted.

In the computer football league, all played all once. No match produced the same score as another.

	W	D	L	Goals F	Goals A
Acorn	2	0	1	5	1
Sinclair	2	0	1	3	5
Commodore	1	0	2	5	6
Atari	1	0	2	4	5

How many goals were scored when Acorn played Atari?

Beeb Forum is a platform for ideas, tips and applications relating to the BBC micro and the Electron, intended for experienced programmers to share their thoughts. For every reader's tip published we pay £5 – or more for something special. Contributions should be typed or printed, with substantial listings on cassette. WRITE TO Beeb Forum, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Electronequip

(Authorised BBC Micro Dealer, and Econet service centre)

ALL ITEMS THIS PAGE – MAIL ORDER OFFICE ONLY

SOFTWARE SALE

most **ACORNSOFT** **£2.99** inc VAT
most **OTHERS** **£1.99** inc VAT

BBC SPARES/ROMS

	.40
	.30
	.46
23	1.20
32	1.20
53	1.35
44	1.47
45	2.00
93	1.00
	.75

S/ULA's etc.	
	4.92
S120	4.23
	.60
	.90
	2.90
	7.25
	5.22
24	.70
o ULA	15.75
al ULA	9.45

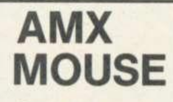
UPGRADES	
Acorn DFS	100.00
Econet	60.00
Speech	47.80
Memory 16-32K	23.00
Analogue input	14.00
Printer port	15.00
Serial	13.00

OTHERS	
Keyboard	52.38
Keyboard swt	2.60
Cass Relay	2.20
BBC Power Supply	52.92

Phone for comprehensive catalogue

ROMS	
1.2 MOS Rom	6.00
BASIC II Rom	26.00
Caretaker	28.00
Communicator	59.00
Termi rom	28.00
Disc Doctor	28.00
DNFS Rom	17.91
Exmon II	25.22
Graphics Rom	28.00
Gremlin Rom	28.00
Help Rom	21.74
Printmaster	28.00
Screen Dump Rom	13.00
Sleuth	25.22
Spellcheck II	26.96
Toolkit	23.45
View Rom	52.00
ViewSheet	52.00
Wordwise Plus	49.00
Wordwise Rom	39.00

arconi
B2
ACKER BALL
1.74 + VAT



AMX MOUSE

£78.82 + VAT



EWISE



"SIDEWAYS rom board for BBC Micro
No soldering required
£33.44 + VAT

MODEMS

TELEMOD II . . £60.83 + VAT
TELEMOD III £152.17 + VAT
NIGHTINGALE
£139.00 + VAT

VOLTMACE JOYSTICKS

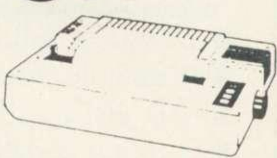
★10% off list prices



		Discounted price inc VAT
BJVOLT 14	Voltmace Delta 14B Joysticks	13.46
BJVOLTAD	Voltmace 14B/1 Adaptor Box	13.36
BJVOLT3T	Voltmace Delta 3B Twin Joysticks	17.99
BJVOLT3S	Voltmace Delta 3B Single Joystick	11.95

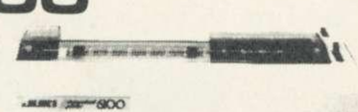
*EPSON

RX-80 FT £212.00 + VAT
FX-80 £315.00 + VAT



Printer Pack **includes** paper & BBC cable **£7.00** + VAT
Screen dump rom available for **£10.00** + VAT

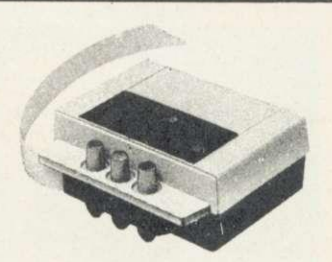
JUKI 6100



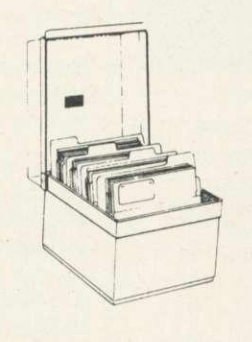


£325.00 + VAT
Sheet feeder
£189.00 + VAT





PENMAN PLOTTER
only £217.00 + VAT



MUSIC 500

Acorns music synthesiser
only £173.04 + VAT

DISC BOXES

30 Disc Box	6.00
40 Disc Box	12.00
45 Disc Box	16.48
90 Disc Box	22.00

DUST COVERS

RX80 F/T	4.65
FX80	4.60
KP810	4.00
BBC Micro	3.60
Microvitec	5.30
PW 1080A	4.00

LISTING PAPER
11 × 9.5" with micro perferations.
£6.52 per 1000

Postage 40p Securicor 4.26 (per parcel)
Please add 15% VAT to all prices & carriage
Prices subject to variation without prior notification
All Offers subject to availability
TRADE, EDUCATIONAL & HMG ORDERS
(Phone for discounts)
Large Stocks – 24 Hour Despatch

MAIL ORDER ENQUIRIES TO BELOW OFFICE



Electronequip

36-38 West Street, Fareham, Hants (0329) 230670





After looking at ways of measuring electrical resistance, Paul Beverley now describes the construction of an analogue port input voltmeter

HIGH VOLTAGE

IF WE have a means of measuring voltage we can then go on to use the computer to calculate current, assuming that we can tell the computer the value of the resistance across which the voltage is being measured.

The voltages we want to be able to measure are going to be too large to be applied directly to the ADC input, which can only measure up to about 1.8 volts, so I have provided a circuit which cuts down the input voltage and also gives some degree of protection against excessively large voltages.

Voltage probe hardware

The voltage probe (figure 1), which was designed by two colleagues, Nigel Eames and Geoff Osborne, will allow you to measure voltages up to 30 or 35 volts dc and 20 to 25 volts ac, depending on the exact reference voltage in your computer. The probe circuit consists of a potential divider formed from two pairs of resistors (R1 + R2) and (R3 + R4).

The transistor TR1 gives over-voltage protection to the ADC inputs, and the diode D1 both protects it against reverse voltages when measuring dc, and acts as a rectifier for ac measurements. Capacitor C1 reduces the amount of noise pick-up on the input line to the computer and also acts as the reservoir or smoothing capacitor for ac measurements.

The top half of the potential divider has been made up from two separate resistors for a number of reasons. First, by connecting the diode D1 at the junction of the two resistors we enable it to perform the dual functions of protection and rectification. The only disadvantage of doing this is that the input impedance of the probe is lowered when measuring ac. However, it is still considerably higher than most moving coil meters and more than adequate for most purposes.

Paul Beverley's program to run the Voltmeter is on yellow page 108

Secondly, from a purely practical point of view, it is easier to obtain high stability components with lower resistance values, and it is the long-term stability of these components rather than their actual tolerance which is the important factor. Thirdly, the very fact of having two components on the circuit board instead of one is a safeguard in itself. In the event of one of the components becoming short-circuited, either by component failure or by a wiring error, the ADC input is still protected by the other resistor together with the protection network.

Remember that you could be connecting anything up to about 30 or 40 volts across this circuit and protection for the computer must be maintained at the highest level. For this reason it would be best to mount the circuit board inside an insulated box so that there is no possibility of a high voltage point on the circuit under test touching the sensitive ADC input. The prototype was made on a piece of printed circuit board and mounted in an old toothbrush box. There is no reason, though, why you shouldn't mount the components on stripboard (such as Veroboard) and put the board in an ordinary plastic box, using flying leads both for the 15-way plug and for the connections to the circuit under test.

The lower half of the potential divider is formed by the resistors R3 and R4 in series. The base-emitter junction of TR1 is placed across R4 and the collector-emitter connections across both R3 and R4. When the probe is applied to an unknown voltage, a very small current – only about 3 microamps at maximum – flows through the whole of the resistor chain. As this current passes through R3 and R4, a voltage is produced which is proportional to the voltage at the probe tip. This is the voltage which is applied to the ADC input.

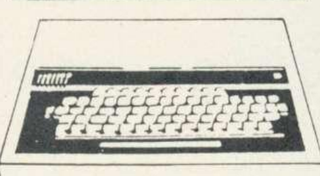
The transistor TR1 is normally switched off (ie, has a high resistance between collector and emitter) and does not affect this voltage. However, if the voltage applied to the probe becomes too high, the voltage developed across R4 will be sufficient to start current flowing in the base-emitter junction. This tends to turn the transistor on and decreases the collector-emitter resistance. The circuit is designed so that the transistor does not start to switch on until the input voltage gets above the measurable range, otherwise this would affect the linearity of the measurement. However, the design is such that even if the input voltage rises to as much as 100 volts, the voltage applied to the ADC input never rises above 3 volts. And even this is still somewhat less than the absolute maximum that you can safely apply to the input (5 volts).

When measuring dc, the diode D1 is normally reverse biased and does not affect the operation of the circuit. However, if the connections to the probe are

SYSTEMS

View	£58
ViewSheet	£57
WordWise	£32
WordWise Plus	£49
StarBase	£69
Gemini Data	£115
PrintMaster	£29
Termi	£69
Disk Doctor	£29
Pace Modem including software	£135
Communicator	£23

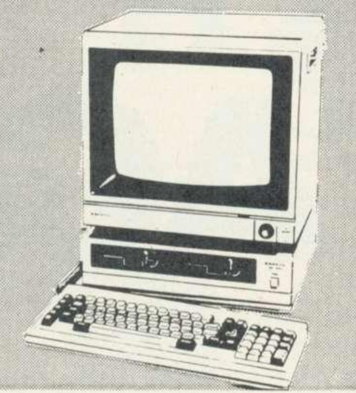
BBC & DDFS	£379
BBC B	£349
BBC BD	£399



BBC includes ⑤ games FREE

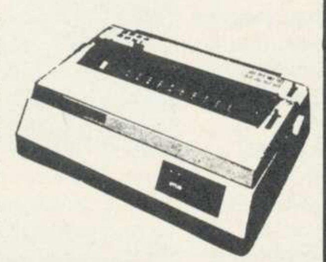
Sanyo 555 Q 256k Ram £999

IBM compatible
2×360 Drives ✶
Price includes:
Wordstar
Mailmerge
Info-Star
Calc-Star
Basic+DOS
Mono monitor

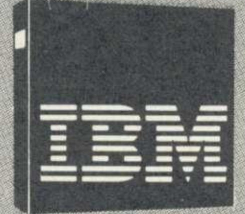


PRINTERS

Brother HR 15	£389
Juki 6100	£379
Juki 2200	£249
Epson RX80 FT	£269
Epson FX80	£379
Cannon 80 COL	£299
Cannon 156 COL	£399



DISKETTES in packs of 10



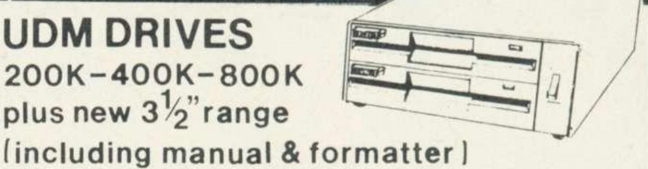
SS 40tk..........	£ 19.90
DS 40tk.........	£ 20.00
DS 80tk.........	£ 26.00

✶ HIGHEST QUALITY YOU CAN BUY ✶

NOW FOR A REAL BARGAIN

Prices include VAT

UDM DRIVES



200K–400K–800K
plus new 3½" range
(including manual & formatter)

100K single unit	£79
200K dual unit	£150
200K single unit	£125
400K dual unit	£205

400K single unit	£160
800K dual unit	£259

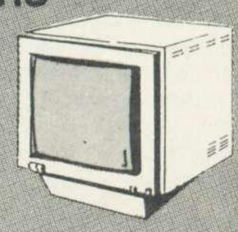
All 80TK drives are switchable 40/80
PS unit .... +£20

UDM DDFS	£95
with Disk Drive	£79 ✶

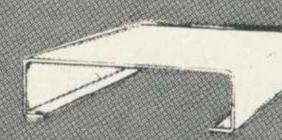
Rom Expansion including FREE software £55.00

MICOVITEC MONITORS

Medium resolution	£189
High resolution	£249
Extra High resolution	£399
AP=+£25	
Sanyo/BMC 12" HC	£110
Philips 12" Hi.Res......	£95



ACCESSORIES



BBC Stands	£15.00
Dust covers (for BBC Drives and Printers)	£5.60

Disk storage boxes £15.00 (takes 35)
Disk storage boxes £20.00 (takes 80)



MICROWARE

NORTH LONDON 637, Holloway Road, London N19 5SS 01-281 2431

SOUTH LONDON 67, Westow Street, Upper Norward London SE19 01-771 6373

MIDLANDS 14, Charles Street, Hanley, Stoke-on-Trent (0782) 269 883

Name
Address
Signed

ORDER FORM

Prices include VAT

+£10 for delivery. £2.50 software and diskettes

Product	Price	Qty	Total
			£
			£
			£

CREDIT CARD No.....
TOTAL SUM ENCLOSED

All products are brand new and are offered with full manufactures warranty

reversed, the diode becomes forward biased, conducts and therefore prevents the ADC inputs from becoming more than a fraction of a volt negative. When making ac measurements, the diode conducts on the negative half cycles and thus only allows the capacitor C1 to become positively charged.

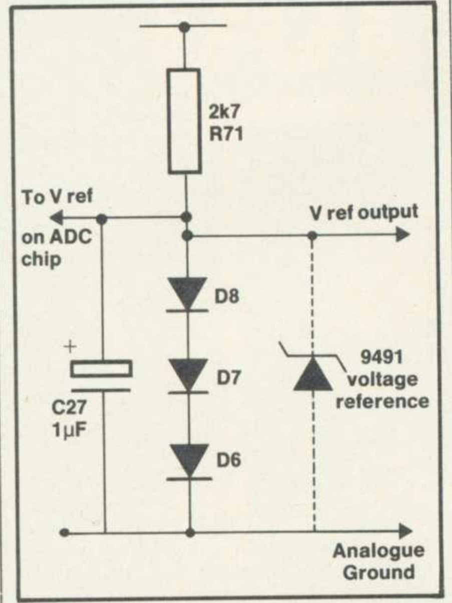


Figure 2. ADC voltage reference circuit showing extra voltage reference diode

Calibration

While the accuracy obtainable with this simple circuit when measuring ac is not as good as from electronic meters, it is perfectly acceptable if care is taken when calibrating. The best accuracy on ac is obtained from a calibration point of 10 volts, ie, about half scale. Under these conditions, the readings were at worst only about four per cent out at the ends of the scale (0-20 volts). When measuring dc, the results were much better. From a calibration point of 15 volts, the readings were within one per cent of those given by a commercial digital voltmeter.

Remember, though, that the voltage standard within the computer, against which we are measuring, is not a very accurate one – hence the need for calibration. You need to use high stability resisitors for the probe so that variations of the component values over a period of time are minimised. Even so, you will find there is a good deal of drift in the accuracy of the voltmeter as a whole. If you apply a constant voltage from a stabilised power supply to the probe input you will find that as the computer warms up, the measured voltage varies by something like five or six per cent. After an hour or so this should stabilise a little, assuming that the room temperature is not varying too much, and the variation should be less than about one per cent.

This is quite adequate for most purposes, but for the highest accuracy you could, in a school or college laboratory, use a Weston standard cell connected to one of the other ADC inputs and calibrate the probe relative to that. It is perfectly safe to apply one of these cells directly to the ADC. Because the voltage is only just over one volt, it will not damage the ADC input, nor will it harm the cell since the impedance of the ADC input is about 10 megohms.

Component list

R_1, R_2 4.7M
R_3 470k
R_4 100k
C_1 470 nF Polyester or similar 100 volts working
D_1 0A202
TR_1 BC 182
ALL R's Metal film high stability low noise 0.5 w ±5%

Figure 1. Voltage probe hardware

If you want better accuracy, and do not have a Weston cell available, you will have to use some other voltage reference source. One possibility is the 9491 low current band gap reference diode which gives a reference voltage of 1.22 volts. Since this is less than the 1.8 volts of the internal reference, you can simply solder one of these reference diodes into the 15-way plug between pins 11 and 5 or 14 and 8. You could, in theory, mount it on the circuit board with the other components, but it is important for the correct operation of the ADC that you have the reference voltage as close to the chip as possible. Best of all, therefore, would be to go inside the computer and solder the reference diode directly across the three diodes (D6, D7 and D8) that form the voltage reference (see figure 2).

However, it is *not* a good idea to start doing anything inside your computer unless you are reasonably good at soldering and know how to read circuit diagrams, and you should realise that doing so would obviously void the warranty on the computer. If you are sure you know what you are doing, you should refer to figures 3 and 4 which should help you to work out exactly where to solder the diode. But it is difficult to give exact instructions as to how to do this because the component layout is different on the different issues of the printed circuit board. If you have a board layout which is different from those illustrated, you will have to sort out for yourself exactly where to solder the diode.

Having done some tests with a single 9491, I have discovered that by reducing the reference voltage I substantially increase the amount of noise generated by the ADC chip, which is bad enough as it is. It would be better, therefore, to use a higher voltage reference. You could for example, as I did, use two 9491s in series, but as this gives a voltage (2.44 volts) which is higher than the existing voltage reference you would need to disconnect the existing diodes.

You do not need to remove them altogether. It is quite sufficient to cut carefully through one of the diode leads with a pair of side cutters. The two 9491s could then be soldered inside the computer across the existing diodes in the same way (figures 3 and 4) as for a single diode. However, it is *not* a good idea to mount these diodes in the plug itself. If you did, removing the plug would leave the ADC chip with no voltage reference device and therefore +5 volts would be applied to its Vref input.

Voltmeter software

The program to run the voltmeter (listing: page 108) gives a display of the voltage and also allows you to record

on the screen up to four voltages in case you want to remember them for purposes of comparison. To put the most recent voltage value into one of the four memories, simply press the M key. To escape from the program, just press Return. If the voltage reaches the top of the range that the ADC input can measure, a sound is emitted to warn you that the input voltage is getting too big.

The program starts by asking for a calibration voltage. At this stage, if you press Return, it assumes the calibration factor in line 40 and carries on with the measurement. If, on the other hand, you do wish to change the calibration, you apply the probe to the calibration voltage, type in the value of the voltage, then press Return. If you wish to maintain this new calibration for future use, you stop the program by pressing the Return key again and then type:

```
PRINT scalefactor
```

You can then put this new value into line 40 and save the program again. If

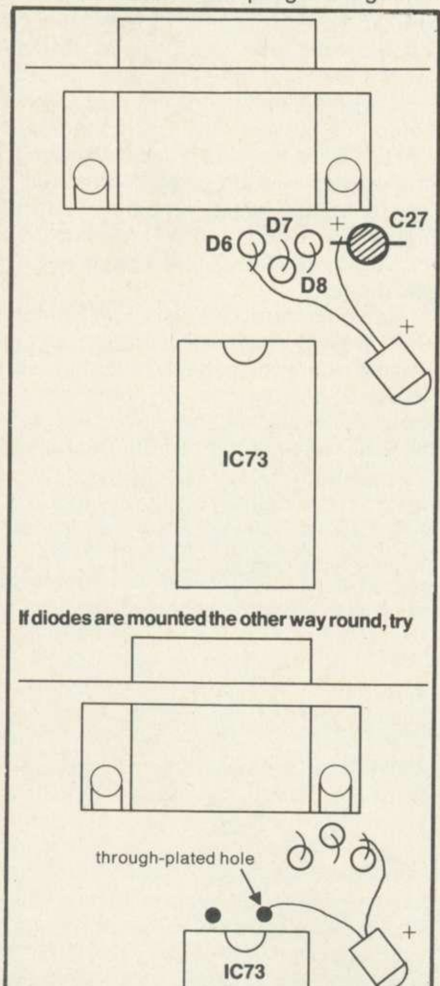


Figure 3. Fitting a 9491 voltage reference diode inside the computer on PCBs issue 2 and 3. (If two diodes are to be used in series, cut through the lead of diode D7)

you want to work to the highest possible accuracy, you should allow the computer to warm up for at least half an hour before you do this calibration.

If you want to be able to resolve small differences in voltage, you will need to use longer averaging times because of the noise inherent in the ADC chip. Function keys f0 and f1 are programmed to double and halve, respectively, the averaging times for the measurements. Statistical theory tells us that in order to halve the random variation you have to average four times as many readings.

The program consists, after initialisation, of a loop in which the voltage is measured and scaled (line 80), the value is printed out (90, 100) and if the M key is pressed, the most recent value is printed out in one of four positions at the bottom of the screen, and the position is incremented by 10 (line 110). If the position has reached 40, ie, off the edge of the screen, line 120 restores it to zero so that the next time M is pressed, the voltage will be recorded in the first position. Line 130 looks for another key having been pressed, and if it is a function key, the averaging time is changed (140), but if it is Return (150), the program is exited.

The reading of the ADVAL value is done with averaging (210-280). The number of samples is set by the value of samples%. At line 270, a sound is generated if the input voltage reaches the top of the measurable range. The initialisation procedure (300-470) allows the user to choose to calibrate the probe against an external voltage source and sets up the screen reading for the voltage display.

Modifications and applications

It is possible to measure higher voltages than 30 volts. If you put two more 4.7M resistors in series with R1 and R2, you could measure up to about 60 volts, but I don't think it's wise to use the computer to measure voltages much higher than that. You may disagree, but that is up to you to decide. If you wanted to use more than one range and have a range switch, you might think of using a push button on the probe to short out the extra resistors you had added. If the components are mounted in a separate plastic box, you could include a rotary switch to select any number of series resistors for different ranges.

If you have a second set of contacts on the switch, you could use a separate potential divider to feed a voltage back to the second ADC input so that the computer could sense the switch position. However, making this kind of modification increases the likelihood of accidentally damaging your computer, so I have not given any circuits.

If you use the higher voltage reference of the two 9491s with the component values given in figure 1, you will find that the range has increased up to about 40 volts. If you want to bring the range back down to more like 30 volts,

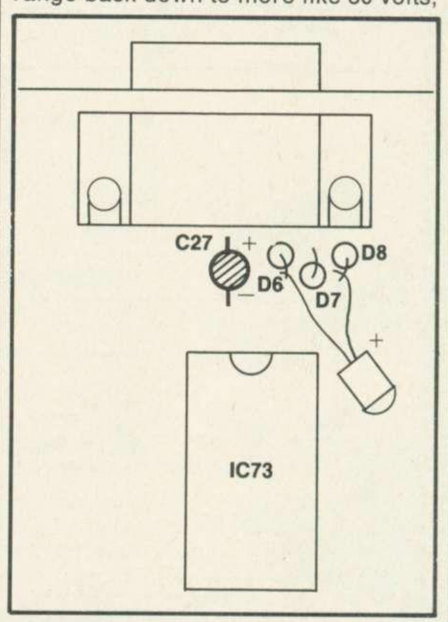


Figure 4. Fitting a 9491 voltage reference diode inside the computer on PCBs issue 4 and 7. (If two diodes are to be used in series, cut through the lead of diode D7)

change R3 to 680k. Also, at the top end, as the input voltage rises towards the 2.44 volts of the reference, the transistor will begin to switch on, thus reducing the linearity. To stop this happening, you should reduce R4 to 82k.

Once you can get the computer to measure voltage, there are all sorts of applications that you could try. For example, you could do some quite complex automatic testing of components and circuits by making up four probes, one for each of the ADC inputs. Or it would be very simple to test a circuit for resonance by generating a square wave out of PB7 on the user port, and using the probe to measure the voltage across the resonant circuit.

One last thing that is important to realise is that the voltage you are measuring is with respect to the zero volts line of the computer. Therefore, you must be very careful *not* to measure voltages on a circuit that has, like many older television sets, a 'live' chassis. Also, if you are going to be using more than one probe, you must always be measuring with respect to one particular point in the circuit under test – usually the zero volts line of the power supply. If you do need to measure voltages with respect to different points, you will have to use two probes applied to the two points between which the voltage is to be measured, and get the computer to calculate the difference between the two voltages.

Rock steady vision at a rock bottom price



The only thing that seems to stand still on some colour monitors is the price. But at Opus we've now made our RGB High Resolution colour monitor even more affordable – it's down to just £199.95, and the picture quality is as rock steady as ever.
What's more we deliver within 48-hours and give you an unrivalled warranty plan to guarantee your peace of mind for the next two years. And if that's not enough our price includes carriage, VAT and connection leads.
Our JVC monitor (580×470 pixels) has received ample praise from the computer press. Acorn User said:
"... gave steadier pictures than the Microvitec Cub, and the colours were rather better."

Personal Computer News added:
"There is no doubt that the JVC range of ECM colour monitors is excellent value for money... there is no loss in quality of picture after long periods..."

The unit has a 14" screen and is suitable for use with the BBC Micro, Electron, Sinclair QL, Lynx, Oric, Apple, IBM, Amstrad and RML 480Z and most other leading micros.

Simply post the coupon below to: Opus Supplies Limited, or telephone us quoting your credit card number.

To: Opus Supplies Ltd,
55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.

Please rush me the following:
(PRICES INCLUDE VAT AND CARRIAGE)

____ High Resolution colour monitor(s) at £199.95 each (inc. VAT)

I enclose a cheque for £____ or please debit my credit card account with the amount of £____
My Access ☐ Barclaycard ☐ (please tick) no. is:

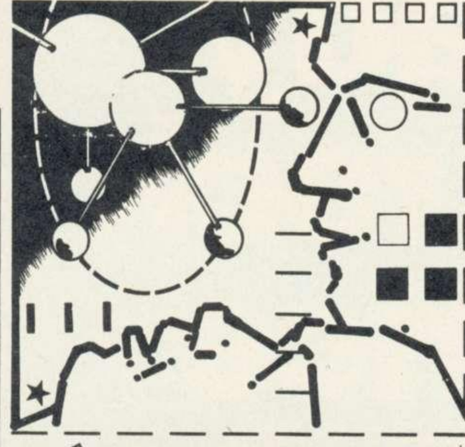
My computer is____

Name____

Address____

Telephone____

Opus. Opus Supplies Ltd.
55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.
TELEPHONE: 0737-65080



Magic on the micro, a plaintive plea for help, an assembler label bug and a disc controller modification – Mike Barwise brings you them all

£5 Find the lady

THIS month we open our proceedings with a short listing for 'Find the Lady', the invention of David Hambly of Essex, who bought his Atom recently for less than £20! He is a professional magician, a member of the International Brotherhood of Magicians and author of the ZX-81 based book *Computer Magic.*

I have polished Mr Hambly's program slightly (see listing below), but I think his listing is a pretty good effort as he tells me he has only had his Atom for six weeks. Nevertheless, I gather that the Atom is already in use in his professional magical work, and that he is converting his existing Spectrum material to run on the Atom – a demonstration of confidence in our machine if ever there was one!

Ignorance isn't bliss

I RECEIVED the following plaintive letter from A Bolton of London . . .

Some months ago I bought an Atom because (a) I wanted to learn 6502 machine code and (b) it was cheap. Or possibly vice versa. Having got the hang of it, I've become quite enamoured of the machine and I've run into a major hurdle: I don't really know anything about the thing.

The Atom manual mentions a Technical Manual, which I don't have. I don't know anything about the extension bus or the VIA connector. Inside, chips IC1, IC2, IC3, IC4, IC5 and IC50 are missing, together with another chip also apparently labelled IC2, which I suspect is the extension ROM.

I haven't the foggiest how to hang a printer on the thing, and it doesn't have an RS232 so it can't even talk to any of my other computers. Who can supply me with information? And are there any people/companies still supplying software/hardware for the Atom? . . .

The Technical Manual is mainly for those who bought their Atoms as kits long ago (1980). It does not tell you very much that you can't find elsewhere, except how to build the kit. The chips you need for the printer port are:

IC1 6522
IC50 74LS244

A 26-way right-angle connector should also be fitted in position PL5. A BBC micro printer cable will then connect the Atom to a Centronics interfaced printer, and CTRL-B and CTRL-C turn the print stream on and off.

To set up the extension bus, you will need:

IC2 & IC3 81LS95 or 74LS465
IC4 8304
IC5 74LS30

IC4 is getting quite rare, so it would pay to find one soon if you are contemplating future expansion. Again, a connector would be needed for the expansion bus, but its type and fitting depend on the end use. There are also technical limitations and requirements for bus-fitted devices, which I will be discussing in future issues, so watch this space before diving in headlong.

The user VIA port addresses are given in *Theory and Practice*, page 169, but programming the 6522 is a study in itself. I recommend *6502 Assembly Language Subroutines* by Leventhal and Saville (publ. Osborne/McGraw-Hill 1982) for the serious machine code enthusiast.

Finally, Vector Marketing or Acorn itself should be able to put you in touch with people still handling the Atom.

```
10 REM THREE CARD MONTE
20 REM by DAVID HAMBLY
30 REM ATOM FORUM MAY 1985
40 ;
100 @=1;P.$12
110 P.'"****THREE CARD MONTE****"'
120 P.'"****BY- david hambly****"
130 P.'''
140 A=ABSRND%3+1
150 F.X=1TO5
160 P."  xxxx    xxxx    xxxx"'
170 N.
180 P."    >1<     >2<     >3<"''
190 IN."FIND THE LADY. 1,2 OR 3"Z
200 IFZ=A;G.230
210 P.'"wrong IT WAS>"A"< TRY AGAIN"'
220 G.240
230 P.'"well done"'"HAVE ANOTHER GO"'
240 F.X=0TO150;WAIT;N.
250 RUN
```

David Hambly's 'Find the Lady' listing

Crystal connection

FURTHER to my recent comments on disc controllers for the Atom (*March issue*), I have investigated a bug in the system, reported by several users.

Some disc users have found that the Acorn FDC card with the on-board crystal oscillator (and the early or user-constructed CUBE FDC card) occasionally seems to lock up and fail to work on power-up. I have had this problem once or twice, and found that the only way out was power down and try again. I think I have now found the answer.

The problem seems to be due to an unstable crystal oscillator. When I put a 'scope on the oscillator during such a lock-up, I found it happily running at 8MHz instead of 4MHz – twice its expected speed. The theory behind this is quite complex, but suffice it to say that the 8271 cannot service a $5\frac{1}{4}$ inch disc at the double clock speed.

The crystal oscillator consists of a pair of inverters (7404 or 74LS04) con-

nected in series via a capacitor. Each inverter has a resistor connected across it, and the crystal is connected across the whole thing (figure 1). The resistor values have to be increased to 1000 ohms, and a small capacitor (22pF) added between each leg of the crystal and ground, to keep the oscillator stable at its proper frequency (figure 2). The capacitors are a standard modification to the later CUBE cards, but they alone still do not entirely eliminate the problem.

The capacitors should be fitted to the reverse of the board (the opposite side to the other components), and grounded to any convenient ground track. The green resist coating can be carefully scraped away to reveal a small area onto which they can be soldered. The capacitors should be of the tubular polystyrene type, and must *not* be tacked down with superglue: they will dissolve in it. Also, soldering time must be kept short, or they will overheat and melt.

Please note that you should not carry out this modification unless you have the lock-up problem and you are pretty familiar with soldering and PCB tracing. Unless you are fairly skilled you can damage the board while removing the old resistors, and if the FDC is working properly anyway, there is no point in fiddling with it.

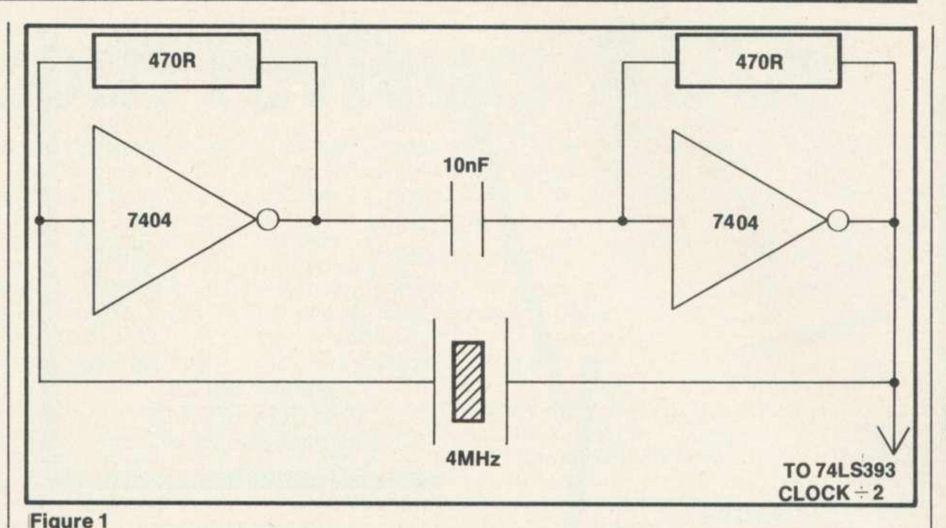


Figure 1

1Ko
1Ko
10nF
7404
7404
22pF
POLYSTYRENE
4MHz
TO 74LS393
CLOCK ÷ 2
22pF
POLYSTYRENE
ANY CLOSE GROUND POINT

Figure 2

Assembler label bug

PLAYING recently with my Atom assembler, I was called upon to use a very large number of labels (about 200). For clarity, I decided to allocate a different array name to each major subroutine and dimension a dozen or so labels for each. This is in general good practice, as it is immediately apparent which section of the program a JSR, JMP or longish branch goes to.

While writing this mammoth program, I found a horrible bug which is not documented anywhere, as far as I know. While it is obvious to any assembler programmer that the Atom variables A, P, X, Y should be reserved to avoid confusion in fact the only variables it is essential to reserve are A and P. X and Y are discriminated syntactically from the X and Y registers of the 6502 during assembly. This makes sense when you realise that the assembler is only writing machine code, not running it.

P, of course, is modified as assembly proceeds, and the assembler cannot discriminate in, for example, ASL A whether you are requesting a shift of the accumulator or of memory location A. X and Y as operands modify the selected OP code, and as variables hold values. They can therefore serve the dual purpose, although with loss of clarity.

However, to our bug ... *Atomic Theory and Practice* states that 'any of the array variables AA-ZZ may be used as labels in the assembler ...' (page 171 and elsewhere). *Be warned!* The Atom seems totally unable to accept the label AAx as the parameter for the JSR or JMP OPcodes with forward references. In any case, a label used for such a forward reference should be equated with P outside the assembler two-pass loop, but for some reason the label AAx is not assigned by this procedure.

The principle behind the error result when using any other array label is very simple. An unassigned assembler label may point to any address. If by chance it points to a zero page address, the Atom throws it out if the OPcode is a JSR or JMP, as JSR or JMP to zero page are disallowed in Atom assembler. The presetting of the label to any arbitrary value which is not zero page prevents the error terminating the assembly.

I can see no obvious reason for the special case of AAx. Even a trace of the assembly process has not shown anything up. Any readers who have had this problem, or who would like to experiment and establish why it occurs, are invited to send in their findings. A good answer with documentary proof could win you some nasty little chocolate coins (or nearest equivalent).

A tip for those without the urge to investigate: if you have used AAx in this manner and you keep getting Assembler Error (156) at the relevant point, try changing the label name before despairing and assuming you can't type.

Leigh Computer Systems

NEVER BEATEN ON PRICE!

PRINTERS

- CANON 1156A £399.00
- CANON PW1080A
- EPSON RX 80 £299.00
- EPSON RX 80 F/T £218.50
- EPSON FX 80 £245.00
- EPSON MX 100 £373.75
- EPSON FX 100 £420.00
- EPSON DX 100 (Daisy-wheel) £487.50
- EPSON JX 80 £408.25
- EPSON LQ 1500 £516.00
- JUKI 6100 £1019.00
- MANNESMANN TALLY MT80 £369.00
- MANNESMANN TALLY MT 180 £199.00 £665.00

Serial Interfaces for Epson

- 8143 £41.00
- 8148 £64.00
- SILVER REED 400 £316.00
- SILVER REED 500 £373.00
- SILVER REED 550 £574.00
- SILVER REED 770 £834.00
- 2000 SHEETS
- PRINTER LEADS £8.00
- CUT SHEET FEEDER FOR 550 or 770 £240.00
- SILVER REED TYPEWRITER EX43N £275.00
- COMPUTER INTERFACE £99.00

ROMS

Wordwise	£36.80	Gremlin	£31.00
View	£59.95	Print Master	£31.00
Graphics ROM	£31.00	Caretaker	£31.00
Disc Doctor	£31.00	Communicator	£65.00
		Wordwise +	£57.00

EPROMS

2764	£5.00
27128	£11.95
8271's in stock	

OPUS DISK DRIVES
(WITH 2 YEARS GUARANTEE)

5400	£99.00
5401	£109.00
5402	£149.00
5802	£173.00
5401D	£256.00
5402D	£335.00
5802D	£369.00
54021SD	£159.00
54021SD	£189.00
5802SD	£215.00

SPECIAL OFFER
OPUS DDFS @ £55.00
when purchased with disk drives.

EDUCATIONAL ORDERS SUPPLIED
—Price list available on application
ALL PRICES INCLUDE VAT

MONITORS

DIGIVISION	£169.00
MICROVITEC CUB 1431 14" TTL	£189.00
MICROVITEC CUB 1451 14" TTL	£269.00
MICROVITEC CUB 1441 14" TTL	£399.00
AU Microvitec Cub monitors, BBC Electron, Oric, 48 oz compatible.	£275.00
QL MONITOR	
SABA (same as Normende)	£199.00
Manual	£219.00
Remote	£84.00
Philips Green Screen 7502	£89.00
Philips Amber Screen 7502	£105.00
750 2 For IBM PC.	

PERIPHERALS

PRO Link Interface	£9.95
Cumana Graphpad	£69.00
AMX Mouse	£78.00
Teak Monitor Stand	£10.35
Marconi Tracker Ball	£69.00
HCR Eprom Programmer	£57.00
HCR 16K RAM Board	£36.00
Extra RAM For RAM Board	£23.00

COMPUTERS

ACORN ELECTRON	£129.00
BBC B	£349.00
BBC B with DFS	£399.00
TATUNG EINSTEIN	£499.00
SANYO 555	£995.00
ADVANCED 86B:	
128K MODEL	£1248.90
256K MODEL	£1329.90

75 CROSS STREET, SALE
MANCHESTER
Telephone: 061-905 2144

7 COVENTRY ROAD, HINCKLEY
LEICS
Telephone: 0455 612139

CONTEX

Professional Software

Fast delivery for the BBC Computer

MK IV SPREADSHEET

```
Insurance comparison
Net Present Value at 7% inflation/annum
        Company A        Company B
Year    Sum     NPV      Sum     NPV

  1    50000   50000    50000   50000
  2    50000   46729    50000   46729
  3    50000   43672    50000   43672
  4    65000   53059    50000   40815
  5    65000   49588    50000   38145
  6    65000   46344    75000   53474
  7    84500   56306    75000   49976
  8    84500   52622    75000   46706
  9    84500   49180    75000   43651
```

- Evaluate financial & statistical models over 1,000 cells in size
- Versatile and friendly
- Extensive disc overlays
- 9 digit accuracy
- Variable column widths and decimal places
- 4-way scroll; heading stay on screen
- Programmable scripted input & printed output
- Word processing interface
- Save, restore and merge from disc or tape
- Full instruction manual
- Much, much more

MK IV SPREADSHEET on disc £14.99 inc
MK III on cassette (a few less facilties) £9.99 inc

TYPING TUTOR

- Quickly learn to touch type
- Over 90 smoothly graded lessons
- Word scan line checking system
- Free format option
- Clock, audio key click, metronome
- Target WPM and percentage correct
- Revise target facilities
- May add own lessons for specialised training

```
Lesson 90, line 1                         16

Copy text as it is presented
Timing starts when you start and
stops when req'd no.of characters typed
----------------------------------------

The quick brown fox jumped over the
The quick brown fox jumped over the

----------------------------------------

Your time is 26 words per minute
You have made no errors
```

Disc £11.99 inc
Cassette £9.99 inc

CONTEX COMPUTING **Tel: Cardington (02303) 347**
15 Woodlands Close, Cople, Bedford MK44 3UE

Enc: £

Please supply **SPREADSHEET/TYPING TUTOR CASSETTE/DISC 40tk/DISC 80tk**

Name ....

Address ....

....

A5

EMS PROGRAMMING

PROBLEMS WITH METRIC OR SI UNITS?

The METRICATOR suite of programs for the BBC-B and ELECTRON may be your answer. Can convert ANY unit into ANY other compatible unit eg. KM/LITRE into MILES/GAL or BTU/HOUR/FT2 into JOULES/SEC/M2. "SI" may be specified and the correct SI equivalent automatically calculated. 15 UNIQUE routines designed for EASY insertion into YOUR program give instant access to many thousands of combinations of units. "Used at home and abroad in College, University and Industry; and by Accountants and Consulting Engineers. A popular and invaluable system. Includes FREE programs for immediate conversions and printing tables."

LEARNING NAVIGATION?

NAVREC helps you learn the lights of sea going vessels, the shapes of buoys, signal code flags, marks and morse code. Altogether eight programs giving full graphic illustrations including simulated views of ship's lights at night. Questions and answer tests included. This suite is great value for money and would please any nautical man. Or send for the details of many more programs including the developing "ENGPAC" for engineers.

MATHPAC – A suite of advanced routines including a very fast linear equation solver with unlimited size plotter.

WANTED! more utilities and educational/scientific/mathematical/engineering programs and routines. Write for terms. Machine compatible Pascal now accepted.

Prices (Inc p&p)

METRICATOR Tape version £6.95. 40 track disc £9.95
Instruction manual and program listing only £3.75
EMS-BEEBGRAPH (equation solver and plotter) TAPE.......£7.95 40 track disc........£9.95
NAVREC 40-track disc only £9.95

Remittance to:– "EMS Programming". 134 Buckswood Drive, Crawley, Sussex RH11 8JG. Or send SAE for details of available programs including BEEBGRAPH – equations solver and plotter.



C.B.C.S.
161 DENTON ST
DENTON HOLME
CARLISLE
Tel:
(0228) 25355

BBC Model BD	£425.00
BBC Model B	£360.00
Acorn Electron	£120.00
Electron +1 Interface	£51.00
Electron +3 Interface	£220.00
FX 80 Printer	£399.00
RX 80 FT Printer	£269.00
FX 100 Printer	£520.00
Juki Daisy wheel	£389.00
BBC Grafpad	£120.00
ATPL Sidewise ROM Board	£43.00
Cumana CSX 100	£105.00
Cumana CSX 200	£139.00
Cumana CSX 400	£165.00
Cumana CS 400	£179.00
6502 2nd Processor	£189.00
Z80 2nd Processor	£345.00
Prestel Adaptor	£112.00

Send stamped addressed envelope for full price list. To order any of the above items send cheque to cover full amount + £2.20 p&p.

ALL PRICES INCLUDE VAT

Starter pack based on *View*

A STARTER pack for businessmen to introduce them to standard software and techniques is set for release from Acornsoft.

Included on the disc will be cut-down versions of the company's own wordprocessor, spreadsheet, database and desk diary, with examples of what can be done, such as holiday wall charts.

The idea was tried out on the Beeb in 1983 in a package designed to introduce local government officials in the country's town halls to computing. This was a much larger set of software covering a wide range of applications and has been a success, producing a 'surplus' (they don't make profits) for the local authorities behind it.

Acornsoft's pack will cost £52 (plus VAT). The wordprocessor will be based on *View*, which comes in ROM for £60. The mini version will be loaded in from disc and only runs in modes 6 or 7 with just a third of the functions normally available.

The spreadsheet will be a similar version of *Viewsheet*.

Acorn reviews ABCs

THE future of Acorn's range of business computers, the ABCs, is to be decided this month. Elserino Piol, who masterminded Olivetti's deal with Acorn, has said there will be no product overlap, and will undoubtedly want a say in Acorn's strategy.

Under the new management at Acorn the range will be switched into the scientific and technical division under Jeff Tansley, formerly leader of the 32016 project team.

Alex Reid, the company's acting chairman, described this as 'refocusing', but it appears more fundamental than that. The setting up of a chain of business centres has ground to a halt and production machines have yet to appear.

The business division in Acorn will handle the Communicator, due to appear in the summer, and Chain, a communications terminal based on the Electron.

Both these products will be sold to other companies to put their own badges on, so there will be no Acorn launch as such, although the Communicator is seen as having a future in the home.

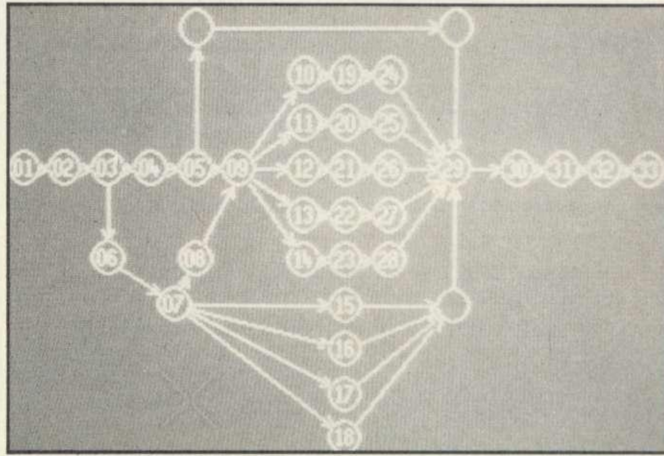
The Communicator is a 16-bit computer with built-in communications, LCD screen, disc or micro cassette storage and software. The general approach of the machine is similar to that adopted by ICL with the One Per Desk based on Sinclair's QL.

The Chain terminal consists of an Electron with an intelligent modem, extra memory and communications software. British Telecom's Merlin division is to market this under the snappy title of M2105, initially as part of a communications system for the health service known as Healthnet.

Computer guide

THE Computer Users' Year Book is a guide to computers, peripherals, services and suppliers. According to the publishers, this past year has seen the biggest ever changes in content.

Copies can be ordered from Booksales Dept. Computing Publications, 52-55 Frith Street, London W1A 2HG, tel: 01-439 4242, at £57.25 plus £2.20 P&P.



A typical network of timed activities

Spreadsheets for small companies

INTEGRATED accounting packages whereby data can be passed between all the different parts of the system – sales, purchasing, invoicing, etc – appear to be the flavour of the month.

Three systems ranging in price from £115 to £500 have appeared recently, all of them claiming to do similar jobs, although the way they perform the tasks, and to what depth, will be the deciding factors in choosing one.

Gemini's suite is the most expensive at £99.95 for each of the five modules. These cover purchase ledger, nominal ledger, invoicing and sales ledger, stock control and payroll.

Double disc drives are needed to make the best use of the software. The company also runs a back-up service for £12 a year and will supply printed stationery for use with the software.

Next is Diamondsoft's system which has been upgraded with a database and covers five tasks. Each part costs £30 and will work from a single, 40-track disc.

Finally, DTCTrader is designed to cope with day-to-day bookkeeping, and balance sheets can be extracted from it. It costs £115 and runs from one disc. DTC is at 145 Thorney Leys, Witney OX8 7NS.

All the above are available on either 40 or 80 track disc formats.

$$\text{ANNE}_{(\text{base } 8)} - \text{ANNE}_{(\text{base } 5)} = \text{ANNE}_{(\text{base } 7)}$$
$$\text{ANNE}_{(\text{base } 10)} = ?$$

Critical path software

CRITICAL path analysis is a technique used to calculate the minimum time needed to complete a given project. Now there is a piece of software designed to do the job which can be run on a BBC micro using either a Z80 or a 6502 second processor.

A simple example is the Sunday lunch, where the critical path is through the cooking of the roast and the making of the gravy (assuming the meat juices are needed for the gravy) – everything else can be done while these two tasks are underway.

With more complex jobs the important factors are much harder to analyse, and that's where the computer comes in.

The ICPA software is used to build up a network of activity paths on the screen, each of which has an estimated time. From this the software will give the latest start and finish time for the activities and identify the critical path.

Networks are entered on the screen with a joystick. Data is entered by selecting an activity and calling up a text window containing prompts for the necessary information.

ICPA was scheduled for release at the start of April at an estimated cost of £150 (plus VAT).

It comes on either 40 or 80 track discs and is marketed by Cats Ltd at 5 Treeview, Broadfield, Crawley RH11 9QH. Tel: (0293) 548068.



THE WORD ON MEMOPLAN

Edward Brown assesses the Z80's wordprocessor

THE FREE software provided with the Z80 second processor includes the wordprocessing package *MemoPlan*. This is a cut-down version of a larger package consisting of wordprocessing, document processing and print processing programs. The *MemoPlan* package supplied by Acorn omits the document processing program and some features of the wordprocessing one.

Also, the configuration program CONFIG.COM has been modified to omit many of its features, but some of these can be replaced, and later in this article you'll find how to do this. The files supplied by Acorn for *MemoPlan* on the Z80 second processor are shown in figure 1. At this stage it's best to take a copy of your *MemoPlan* disc if you wish to follow the examples in this article.

The booklet supplied with the *MemoPlan* package is a general introduction and is good to get you started but does not cover all aspects of the package. Before going on to discuss the programs in more detail I'll look generally at the way *MemoPlan* works.

How it works

MemoPlan consists of an editing and a printing program that work together to produce a wordprocessing facility. When *MemoPlan* is entered by typing MEMO the program MEMO.COM is loaded into memory and executed. This program uses a file called MEMO.SWP to keep a temporary record of the files that it is editing. The file that you were last editing is displayed on the screen and the text that you enter is stored in the temporary file MEMO.SWP. This means that if at any time *MemoPlan* should crash (eg, CTRL Break instead of CTRL f9), you will have lost very little text. Running RECOVER will get back all except the last few characters for you.

You can save the file you are editing at any time by writing it to disc. Many documents can be loaded into *MemoPlan* at the same time. When you change from one to another you are automatically put at the position you were when you last selected that document. The print option allows you to do this painlessly from within *MemoPlan* by chaining to MEMOP.COM which prints the file for you. Alternatively, you can print using MEMOP.COM directly from the CP/M command level. Of the other two programs, RECOVER.COM allows you to create and repair MEMO.SWP, and CONFIG.COM allows you to select the type of printer you wish to use.

Command line program options

The three programs MEMO, MEMOP and RECOVER all have CP/M command line options which can be very useful but are not well documented in the *MemoPlan* booklet. I'll look at these options in more detail and examples of each are given in figures 2, 3 and 4.

MEMO

The 'normal' way to enter the editing mode of *MemoPlan* is to type the command MEMO by itself. The wordprocessor starts working and presents its screen ready for you to edit. However, if you type MEMO followed by a file reference, *MemoPlan* will load the file specified into its main document area overwriting whatever document is there. The main document area is the one you were presented with the first time you entered *MemoPlan* – it may not be the one you were editing last. This facility is useful when editing programs.

In addition there are two options, −W and −P, for controlling the entry into *MemoPlan*. −W will wait before clearing the screen after the title screen. This means that information on the screen can be read before the screen is cleared and is useful if *MemoPlan* is used as part of a SUBMIT command. −P must be followed by a file reference and instructs *MemoPlan*

```
A>DIR
A: MEMO      OVL : MEMO      COM : MEMOHELP TXT : MEMOP     COM
A: MPP       OVL : RECOVER   COM : CONFIG   COM : CONFIG    DAT
A: ACTIONS   DEF : MEMO      SWP
```

MEMO.COM The main section of code for *MemoPlan* editing program
MEMO.OVL Extra code for *MemoPlan*, loaded into memory when needed
MEMOP.COM The main section of code for the *MemoPlan* print program
MPP.OVL Extra code for *MemoPlan* print program, loaded into memory when needed
RECOVER.COM The *MemoPlan* text recovery program, used to create a swap file and recover data when *MemoPlan* has crashed
CONFIG.COM The *MemoPlan* configuration program, used to set up *MemoPlan*
MEMOHELP.TXT The file containing the help messages displayed by the *MemoPlan* help facility
CONFIG.DAT The file containing the predefined printers and terminals, and the configuration information set up by CONFIG.COM
MEMO.SWP The file used for temporary storage of text being edited
ACTIONS.DEF The file containing the list of possible actions in *MemoPlan*

Figure 1. The files supplied by Acorn for *MemoPlan*

to start printing the file specified while editing is in progress.

–PORT and –P are options to MEMOP and MEMO respectively which do produce output. They are not supported by Acorn and are given in the article for completeness. Try them with your copy of the *MemoPlan* disc to see the results.

MEMOP

The normal way to enter the printing mode of *MemoPlan* is through the print command in MEMO, which will print the document you are currently editing after asking for any options. The document is then transferred to a temporary file called MEMO.F$$ and MEMO chains to MEMOP via the MEMO.OVL overlay and prints the file. It's also possible to enter MEMOP followed by a file reference and options on the command line. The options described below are equally valid on the command line and in MEMO.

–nn Where nn is the number of copies that you want

–P Pause after printing each page. Used for single sheet feeding

–NP No Pause after printing each page. This is the default setting

–PAGE nn Start printing at page nn of the document

–Q Quiet mode. This does not display the page count and messages on the console

–O file Online spooling to the file name. This puts the output formatted with page breaks to the file specified

–DEV device Device selection. This tells MEMOP to use the device specified instead of the default device

–NH No header. Omit the standard header on the output

–NM No margin. Omit left and right margins

–T title Title. Use the quoted string following the –T as the title to be put at the top of the document

–L nn Left. Position the left margin at column nn

–R nn Right. Position the right margin at column nn

–TAB nn Tab. Position tab stops at every nn column

–PORT port Port. Redirect the output to another output port (see above).

MEMO Will put you into *MemoPlan*
MEMO TEST.TXT Will put you into *MemoPlan* and overwrite the main document with the file TEST.TXT
MEMO –W Will put you into *MemoPlan* but wait before clearing the screen
MEMO –P TEST.PRN Will put you in *MemoPlan* and print the file TEST.PRN

Figure 2. CP/M command line options for MEMO

MEMOP –5 LETTER.TXT –P –DEV DiabloPS Will print five copies of the file LETTER.TXT on the device DiabloPS (a proportionally spaced Diablo printer) and pause between each page to allow sheets of paper to be inserted

MEMOP DRAFT.TXT –T "draft copy" –O DRAFT.PRN –L10 Will place the formatted text into a file called DRAFT.PRN with a left margin of 10 characters and a title of 'draft copy' on the top of each formatted page

MEMOP TEST2.TXT –NP –Q –NH –NM –PAGE 3 Will print TEST2.TXT starting at page 3 without pausing for sheet insertion, without putting messages on the screen and with no header or margins

MEMOP TEST3.TXT –PORT CONSOLE –R 55 –TAB 8 Will print TEST3.TXT on the printer connected to the console output port with a right margin of 55 and tabs every 8 character positions

Figure 3. CP/M command line options for MEMOP

RECOVER Will recover as much text as it can link to a document

RECOVER –ALL Will recover every piece of text whether sensible or not

RECOVER –CREATE 100 5 Will create a new MEMO. SWP file of 100 pages containing five documents

Figure 4. CP/M command line options for RECOVER

RECOVER

The usual way to use recover is to type RECOVER by itself on the CP/M command line. This will check the MEMO.SWP file to see if it is corrupted and if so, it will try to recover any text that has been lost. If it has not been corrupted the program will verify it. In addition, it's possible to give the following command line options.

–CREATE nn m Create a new swap file containing nn pages and divided into m documents. A page is roughly 1000 characters

–ALL All recovers all text in the MEMO.SWP file and places it in documents for your access. Using the –ALL option will recover deleted text and in some cases garbage. The following procedure should be adopted when using the –ALL option: run RECOVER normally, check and save all documents by using the write option, run RECOVER –ALL, extract and save what text you require, run RECOVER –CREATE nn m, read in the document you want to edit.

Commands in MEMO

To edit in MEMO, use the function and cursor keys. In addition, there are other keys that have special effects and these are summarised in figure 5. Here I'll deal with a few of the more interesting options.

CTRL @	Repeat command, requires a count and a command
CTRL A	Repeat last command or character
CTRL B	Document object
CTRL C	Close text
CTRL D	Delete object forward
CTRL E	Edge of line object
CTRL F	Set direction forwards
CTRL G	Next document
CTRL H	Move backwards
CTRL I	Tab
CTRL J	Line feed
CTRL K	Previous line
CTRL L	Line information
CTRL M	Carriage return
CTRL N	Sentence object (to next carriage return)
CTRL O	Open text
CTRL P	Position information
CTRL Q	Adjust paragraph
CTRL R	Redisplay screen
CTRL S	Search for string
CTRL T	No command
CTRL U	Undelete
CTRL V	Move up screen
CTRL W	Word object
CTRL X	Main menu
CTRL Y	Delete object backwards
CTRL Z	Abort

Figure 5. Summary of what the keys do in MEMO

COPY Will repeat the last command or character typed

CTRL @ Will prompt ESC, enter a number followed by a command or character and it will be repeated the specified number of times

CTRL D or CTRL Y Will put you in delete mode. Using the cursor keys will then delete by character, word, line, paragraph or document forward or backward

CTRL X Will put you into the main menu. Experiment with this and learn more about *MemoPlan*.

Improving MemoPlan

It's common to want a dedicated word-processing disc which, when you turn on the machine, runs straight away. In Appendix J of the CP/M 2.2 manual it explains how to provide this using a BOOT.COM or BOOT.SUB file.

The easiest way of doing this is to type REN BOOT.COM=MEMO.COM. Now, whenever the machine is turned on or CTRL Break is pressed with the disc in drive A, *MemoPlan* will run. However, if you try to print from MEMO, you will get an error saying that the file MEMO.COM is missing. This is because MEMO chains to MEMOP to print and then MEMOP chains back to MEMO to continue editing. To be able to use MEMO as a BOOT.COM file it's

microFAST

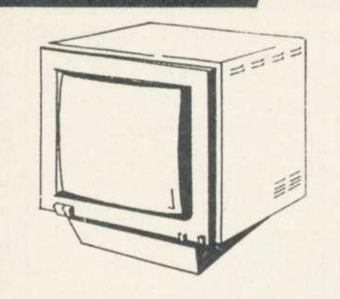
EDUCATIONAL SUPPLIERS

Special Business Offers with TORCH

ZEP-100 £260.00 ex VAT
ZDP-240 £608.00 ex VAT*

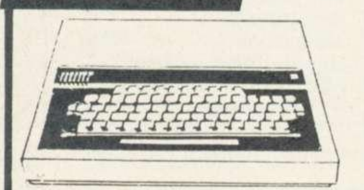
These upgrades for the BBC B(DFS) micro open the door to the world of serious computing. Using the proven Z-80 processor, they provide 64K extra RAM, CPN™ operating system and, three professional software programmes; Perfect Writer® with Speller, Perfect Calc® and Perfect Filer®. CPN™ gives access to the vast range of software written for all CP/M® micros.

mono MONITORS



	ex VAT	inc VAT
Sanyo 8112 18 MHz	£86 + VAT = 99	
Amstrad GT64	£51.30	£59
ISL 20 Swivel 80 col. 20 MHz Tilt + Swivel Base	£68.70	£79*
Zenith 12" 15 MHz	£66.96	£77

PROCESSORS



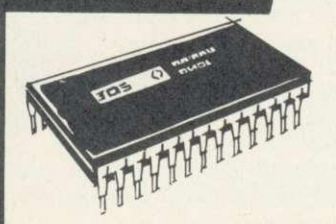
BBC Model B **P.O.A.**

	ex VAT	inc VAT
.BBC 'B'	P.O.A.	
BBC 'B' with DFS	P.O.A.	
Acorn Z80 Ext. Processor	£338.26	£389
Amstrad CPC464	£157.40	£181
5v power + UHF	£24.36	£28
DEC 11/23 + 40 MB	£6086.97	£7000
DEC 11/73 + 170 MB	£10434.79	£12000

APRICOT

Fi inc. Monitor	£1126	£1295
PC (2 × 315K)	£1300	£1495
PC (2 × 720K)	£1465	£1685

DISK INTERFACES



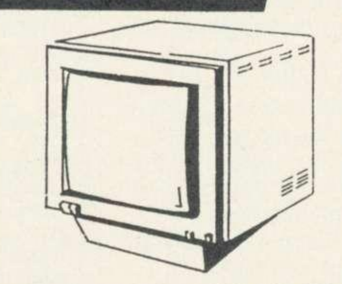
	ex VAT	inc VAT
Acorn DFS	£84.35	£97
NEW Acorn DNFS kit (ring for availability)	£89.57	£103

MODEMS

Selection of Acoustic Couplers and Mini Modems in stock.

	ex VAT	inc VAT
Minor Miracle WS2000	£129.57	£149

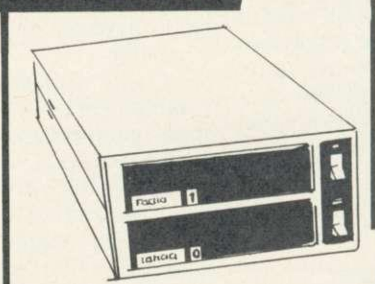
colour MONITORS



Microvitec 1451 BBC £242.61
+ VAT = £279

	ex VAT	inc VAT
Amstrad CTM640	£146.97	£169
Microvitec 1431	£169.58	£195*
1431 (RGB/PAL/AUDIO)	£204·35	£235
Microvitec 1451/QL	£230.43	£265
Microvitec 1451	£242.61	£279
1451 (RGB/PAL/AUDIO)	£291·30	£355
Microvitec 1441	£433.92	£499
Taxankaga Vision III (BBC/APPLE/IBM)	£326.09	£375

DISK DRIVES

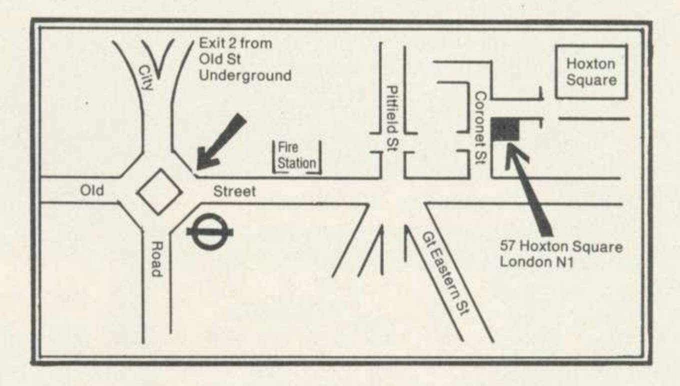


100K 40T £86.09
+ VAT = £99*

	ex VAT	inc VAT
Single		
100K ALPS 40T	£86.10	£99*
100K Chicon 40T OPUS	£112.17	£129
200K Sanyo 3 OPUS	£130.43	£150
400K Mitsubishi 40/80T OPUS	£152.17	£175
Double		
800K Mitsubishi 40/80T OPUS	£320.87	£369

All our Disc Drives come complete with:

- 2 Year guarantee
- Disc Formatter
- Disc Verifier
- Screen Dump Program for Epsons
- Information program on DFS commands
- All cables required for connection to BBC
- Disc and DFS handbook
- Dual Disc Drives include power supply
- Power supply available for single Drives
- Single Drives available in dual drive cases



ACCESS & BARCLAYCARD WELCOME

Prices shown are correct at time of going to press in MARCH

*LIMITED OFFER WHILE STOCKS LAST. MAIL AND PHONE ORDERS ACCEPTED
Carriage—add £10 for Hardware and £1.50 for Software

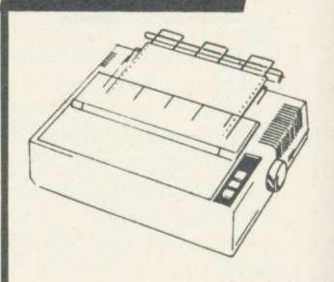
OPEN 9–6 Monday to Saturday

57 Hoxton Square, London N1

Tel: 01-729 1778

microFAST
THE EXPERTS

DOT MATRIX

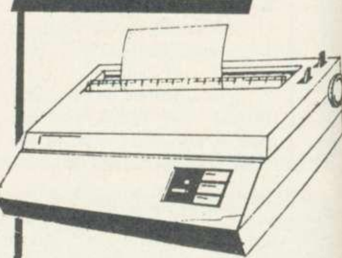


Epson RX80 F/T + £221.74
+ VAT = £255

Ring for details of NLQ option

	ex VAT	inc VAT
KDC FT 5001 (Epson Comp)	£164.35	£189
Epson RX80	£192.17	£221
Epson RX80 F/T +	£221.74	£255
Kaga Taxan 810 (NLQ)	£277.39	£319
Kaga Taxan 910 (NLQ 132 col)	£373.04	£429

DAISYWHEEL



Juki 6100 £329.75
+ VAT = £379

Brother HR15	£329·75	£379
Juki 6100	£329.75	£379
Daisy Step 2000	£230.43	£265
Uchida DWX305	£226.09	£260
Serial Interface Conversions (fitted free)		
8143—Epson	£26.10	£30
8148—Epson (2k buffer XON/XOFF protocol)	£56.53	£65
KDC	£56.33	£65
Daisystep	£60.88	£70
Canon	£69.58	£80
JUKI	£47.84	£55
BBC cables from	£10.44	£12
QL Centronix cable	£33.91	£39

VARIOUS

	ex VAT	Inc VAT
Torch Ext. Processor + Software	£260.00	£299
Torch Ext Processor + twin drives		£699*
Computer Concepts ROMS from	£27.84	£32
Acorn Business Software	£20.88	£24.95
Acorn Data recorder	£27.84	£32
Opus Desk Model 10 with draw	£130.44	£150
Desk Stacking Unit	£20.00	£23
(Lockable version available)		

CPN is a trademark of Torch Computers Ltd. Perfect Software is a trademark of Perfect Software Inc. CP/M is a trademark of Digital Research Inc. IBM is the registered trademark of International Business Machines.

necessary to patch (alter) the code in MEMO.OVL. This procedure is shown in figure 6.

The program CONFIG.COM supplied with *MemoPlan* allows you to select a default printer from a set of predefined printers. However, by applying the patches shown in figure 7, CONFIG can be extended. This gives greater control over the way *MemoPlan* works by allowing you to set the speed at which messages appear, how quickly the text is saved, and even the print area of your printer.

```
A>B:DDT MEMO.OVL
DDT VERS 2.2  }(1)
NEXT  PC
6D00 0100
-D437A,4385 ——————(2)
437A 2D 63 68 61 69 6E -chain
4380 20 6D 65 6D 6F 20  memo
-S4381 ——————————(3)
4381 6D 42 }
4382 65 4F }(4)
4383 6D 4F }
4384 6F 54 }
4385 20 . ——————————(5)
-D437A,4385 ——————(6)
437A 2D 63 68 61 69 6E -chain
4380 20 42 4F 4F 54 20  BOOT
-D4396,43A0
4396 63 68 61 69 6E 20 6D 65 6D 6F chain memo
43A0 20
-S439C
439C 6D 42
439D 65 4F
439E 6D 4F
439F 6F 54
43A0 20 .
-D43C2,43CD
43C2 2D 63 68 61 69 6E 20 6D 65 6D 6F 20 -chain memo
-S43C9
43C9 6D 42
43CA 65 4F
43CB 6D 4F
43CC 6F 54
43CD 20 .
-D43C2,43CD                                                    (7)
43C2 2D 63 68 61 69 6E 20 42 4F 4F 54 20 -chain BOOT
-D43E3,43EE
43E3 2D 63 68 61 69 6E 20 6D 65 6D 6F 00 -chain memo.
-S43EA
43EA 6D 42
43EB 65 4F
43EC 6D 4F
43ED 6F 54
43EE 00 .
-D43E3,43EE
43E3 2D 63 68 61 69 6E 20 42 4F 4F 54 00 -chain BOOT.
-D4468,4478
4468 2D 63 68 61 69 6E 20 6D -chain m
4470 65 6D 6F 00 2D 6E 68 20 2D emo.-nh -
-S446F
446F 6D 42
4470 65 4F
4471 6D 4F
4472 6F 54
4473 00 .
-D4468,4478
4468 2D 63 68 61 69 6E 20 42 -chain B
4470 4F 4F 54 00 2D 6E 68 20 2D OOT.-nh -
-G0 ——————————————————————(8)

A>SAVE 108 MEMO.OVL ——————(9)
A>REN BOOT.COM=MEMO.COM ———(10)
```

1 MEMO.OVL is loaded into memory from 100 to 6D00
2 Display locations 437A to 4385 in hex and ASCII
3 Select 4381 onwards to be altered
4 Alter memo to BOOT
5 End alteration
6 Display again
7 Repeat for the remaining chain commands
8 Return to CP/M command level
9 Save the file (108 decimal is 6C hex, top part of NEXT – PC)
10 Rename the file so that it will auto boot

Non-shaded areas are system responses

Figure 6. The procedure to patch the code in MEMO.OVL

1 CONFIG.COM is loaded into memory from 100 to 5700
2 List location 8E3 onwards in 8080 assembly code
3 Select 8EC onwards to be altered
4 Alter JMP 091C (jump command) to three NOP (no operation)
5 List again
6 Display locations 93A to 952 in hex and ASCII
7 Change N to Y to give terminal menu
8 Change N to Y to give Default Formatting Parameters menu
9 Display again
10 Return to CP/M command level
11 Save the file (86 decimal is 56 hex, top part of NEXT – PC)

Non-shaded areas are system responses

```
A>B:DDT CONFIG.COM
DDT VERS 2.2 }(1)
NEXT  PC
5700 0100
-L8E3 ——————————(2)
 08E3  CALL 0DCE
 08E6  CALL 1051
 08E9  CALL 4AF4
 08EC  JMP  091C
 08EF  LXI  H,0000
 08F2  PUSH H
 08F3  LXI  H,0953
 08F6  PUSH H
 08F7  CALL 3DC5
 08FA  POP  D
 08FB  POP  D
-S8EC ——————————(3)
08EC C3 00 }
08ED 1C 00 }(4)
08EE 09 00 }
08EF 21 . ——————(5)
-L8E3
 08E3  CALL 0DCE
 08E6  CALL 1051
 08E9  CALL 4AF4
 08EC  NOP
 08ED  NOP
 08EE  NOP
 08EF  LXI  H,0000
 08F2  PUSH H
 08F3  LXI  H,0953
 08F6  PUSH H
 08F7  CALL 3DC5
-D93A,952 ——————(6)
093A 43 75 73 74 6F 6D Custom
0940 20 54 65 72 6D 3A 4E 20 44 6F 63 75 50 6C 61 6E  Term:N DocuPlan
0950 3A 4E 00 :N.
-S946
0946 4E 59 }(7)
0947 20 .
-S951
0951 4E 59 }(8)
0952 00 .
-D93A,952 ——————(9)
093A 43 75 73 74 6F 6D Custom
0940 20 54 65 72 6D 3A 59 20 44 6F 63 75 50 6C 61 6E  Term:Y DocuPlan
0950 3A 59 00 :Y.
-G0 ——————————(10)

A>SAVE 86 CONFIG.COM ——————(11)
```

Figure 7. Patches to extend CONFIG

Spreadsheets revisited

'Quickcalc', Beebugsoft, BBC B, £13 (cassette) or £15 (40/80 track disc)

THE FIRST thing I liked about this package was the stout box it came in. This was quickly followed by the pleasure of finding a disc which operates on both 40 and 80 tracks.

The manual is excellent in content and presentation, although the function key strip is rather amateurish. My main criticism is a familiar one – because it works in mode 7 you can only see a small part of the sheet in memory. The actual input of data is quite logical and easy to remember.

Applying the same tests to *Quickcalc*, as to the spreadsheets reviewed in the February issue (pages 137 to 142) revealed a few minor problems. Because it is limited to 50 rows, my long resource allocation program would not fit, but this would not matter to most users of a home-based system. In any case, the program has the useful capability of increasing the number of rows up to 100, but at the expense of the number of columns.

Some other good features are a very simple numerical grid reference which was sufficient to identify slots (eg, 30, 30 rather than AD, 30) and there is a constant 'bytes free' reminder at the heading to reduce the risk of running out of space.

Another excellent feature is the ability to vary individual column widths between 4 and 36 characters, only otherwise found in *Ultracalc 2*. It is capable of changing from calculation in the usual column order to row order.

Where then does *Quickcalc* fit into the range of spreadsheets? It offers many more facilities than *Vu-Calc* and, since it is about the same price, must be judged the better buy for those with a limited range of needs.

Roger Carus

This information will help you compare Quickcalc with the spreadsheets reviewed in our February issue. Marks are out of 10.

Size of matrix 3	**Graphics** 1
Labelling 9	**Printing** 5
Making entries 4	**Wordprocessing linkages** 0
Replication 5	**Speed** 4
Commercial uses 5	**Ease of use** 5
Scientific uses 4	**Documentation** 5
Statistical uses 4	**Overall value** 5
Display 4	

Comments Good cheap sheet for home use. It has 20 columns, 50 rows, a matrix size of 1000 cells with a default cell size of 9 characters. Its window size is 4 columns × 19 rows = 76 cells.

CP/M CORNER

Edward Brown and Richard Clement launch a new column

IN THE February issue Robin Newman presented a method of performing a warm start of BBCBasic in the CP/M environment. This method will work for CP/M with a 1.20 BIOS and a 1.20 Z80 ROM, however it will not work for other versions of BIOS or ROM. A better method is shown in the box.

To understand how this method works it's necessary to explain briefly how the Console Command Processor (CCP) loads and runs a program. When a command is typed to the CCP it first checks to see if it is a built-in command, and if so it is executed.

If it is not then the disc is searched for a file with the command name and a COM extension. If this file is found, the CCP loads it at location 100H onwards. When the file is loaded it calls location 100H and the program starts executing.

When the command WSBasic is typed, the first 100H bytes of BBCBasic in RAM are overwritten with the patched version. Then control is passed to location 100H which initialises the stack pointer to the area used by BBCBasic and then control passes to the warm boot location. Using this method BBCBasic can be warm booted after a Break or Ctrl Break. Once the file WSBasic has been created then the Break key can be defined to enter the commands automatically when pressed.

In addition, we can take advantage of the way the CCP runs programs to rerun programs. To do this type SAVE 0 GO.COM in response to the CCP prompt. Now run a program such as. STAT. When it is finished type GO and the program will now run again.

STAT shows us another way that we can take advantage of the manner in which the CCP works. You will notice that when STAT finishes running it does not access the disc to perform a warm boot. This is because it does not corrupt the CCP or BDOS, so it uses a RET instruction to return to the CCP rather than the time-consuming warm boot. Any application can do this but care must be taken with the stack, as the CCP allocates a 16 byte stack which can easily overflow. This is the reason for initialising the stack as the first instruction of the BBCBasic warm start.

Enter BBCBasic and immediately type *CPM or *BYE to return to the A> prompt. Then use the following procedure with the file DDT.COM on the disc in drive B. Shaded areas are system responses.

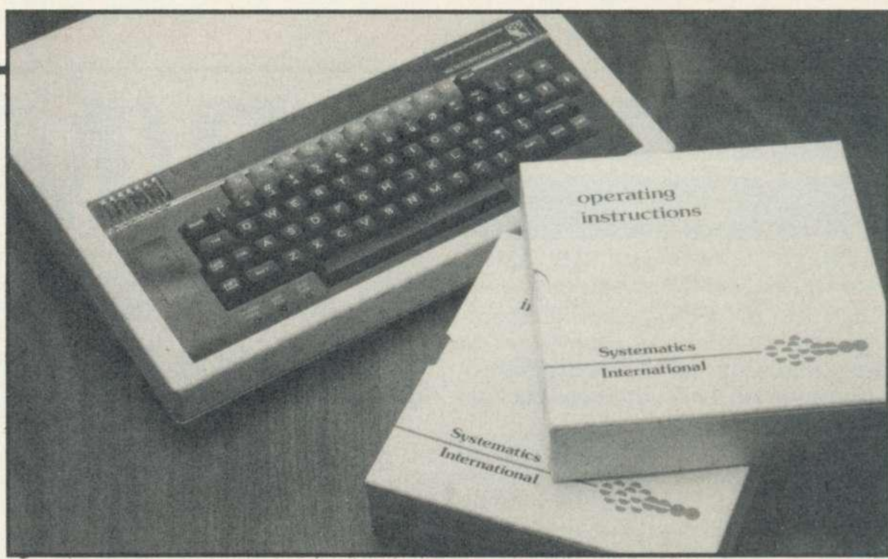
```
A>SAVE 1 WSBASIC.COM
A>B:DDT WSBASIC.COM
DDT VERS 2.2
NEXT  PC
0200 0100
-L100,105
  0100  JMP 012A
  0103  JMP 0197
  0106
-A100
0100  LXI SP,3A00
0103
-G0
A>SAVE 1 WSBASIC.COM
A>BBCBASIC
```

Now load a Basic program and list it. Press Break; and when you get an * prompt type CPM and you will return to the A> prompt. Now type WSBASIC. You will return to BBCBasic and a list will show the old program again. The break key can be programmed to enter these commands automatically by using the *KEY command while in BBCBasic. Remember to re-enable the Escape key once in BBCBasic as it is disabled by the Z80 ROM.

If you're a CP/M user with problems, or have hints you'd like to pass on, then write to CP/M Corner, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Dynamic duos for businesses

'BuSIness Duo Sales & Purchase Ledger Program' and 'BuSIness Duo Stock Control & Invoicing Program', Systematics International, BBC, £89 inc VAT each



A nice suite of programs from Systematics

THESE two new packages come as a welcome development and go a long way towards showing what can be done with elegant procedures designed for the busy businessman.

Each consists of a single standard disc available in a variety of formats.

The *Sales and Purchase Ledger Program* consists of a suite of 11 files running to 67k on two discs, while the *Stock Control and Invoicing Program* has nine programs taking up 39k, again on two discs. Each disc is accompanied by a loose-leaf folder in a strong cardboard box containing the operating instructions, with illustrative examples which are clear and concise.

My main criticism is the limitation on the amount of data which can be handled, and the introductions are very frank about this. The *Sales and Purchase Ledger* will 'cater for 400 customer master records showing account number, name, address, etc, and 750 transaction detail records of receipts, invoices, credit notes, adjustments; and 400 supplier master records showing account number, name, address, etc, and 750 transaction detail records of payments, invoices, credit notes and adjustments.' The *Stock Control and Invoicing Program* can handle 'up to 1000 stock lines; and integrated invoicing.'

It is for the individual to judge whether this is sufficient for his purpose. The number of customers and stock lines permitted should be enough for most purposes, but I should think the scope for transactions might cause problems. It could be sufficient by using short accounting periods or a subdivided system of accounting for different parts of a business, but I suspect that only a business dealing with items of a high unit cost could maintain a whole year's records on one set of files. This makes it fine for a home-based mail order dealer, an estate agent or a functions caterer but not much use for a corner shop.

It is, however, important to realise that this is not a fully integrated package – such as the Acornsoft business suite (reviewed in *Acorn User*, June 1984, pages 103-108 and September 1984, pages 117-118) – that is, the data related to one disc does not transfer to the others in the series. Thus the *Stock Control and Invoicing Program* is quite separate and distinct from the *Sales and Purchase Ledger Program* package, so you cannot sit down and produce a full set of accounts and records from one set of data. In theory this sounds like a serious defect, but after considerable thought I can think of very few examples where it would matter. If a business had a large number of transactions with the same few firms, it would necessitate the transfer of data between the two sets of files which could lead to mistakes.

One basic thing that puzzles me is the absence of provision within the menus of either disc for an identification of drive numbers. The result is that the operator spends an inordinate amount of time changing discs as the prompt instructs.

Taking the *Sales and Purchase Ledger Program* first, let's look at the stages in using the program. With a Booted start you go straight to the Outer Menu which gives a choice of either the Sales Ledger or the Purchase Ledger programs. If you pursue the former through the menu, you arrive at the Master Menu for Sales. This gives a choice of (1) Updatings/Postings, (2) Reports/Setups, Copy Data Files and Exit. As you are starting, you take (2), only to find a further menu requesting Old or New Files for loading. Having none, you choose 'New' and are prompted to insert a blank formatted disc, which loads – and stops! Always impatient, I began again, and reached for the manual. In fact, there is a wait of almost a minute and then it starts to create six files ready for your data. There is nothing wrong with this, but it would have helped if either the manual or the prompt warned you of the delay.

At this point you begin to personalise the accounts and I must say that I grasped what was going on fairly quickly. There are a few niggles, such as the limited space in each line for company names and addresses. In fact, I had great difficulty in finding advertisers in *Acorn User* whose names conveniently fitted the 20 spaces without abbreviation. It seems quite difficult to go back and amend entries without producing printouts, checking them and then making compensating adjustments. More annoyingly there seems to be no browse facility to let you look at the Day Book by scanning through the entries. On the other hand, there is an excellent Password requirement which ensures security.

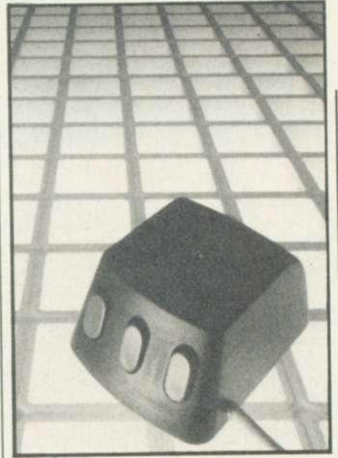
The Sales Ledger program lets you adapt the presentation to your own company, keep regularly updated details of customer accounts, enter transactions, print ledger cards, statements and a variety of reports, and close accounts keeping all debts in age order – and that meets most requirements.

The other programs are comparable and feel rather better, particularly *Purchase Ledger and Stock Control*, although that could be because I came to them later or am more at home with their terminology. I could find no faults in their logic and would have every confidence in using them.

The printing facility works very well with my daisy-wheel printer and quickly produces very acceptable, if basic, statements, stock lists and reports on continuous stationery. There is a facility to use company paper with headings which I did not test but I suspect that setting it up might be awkward. My only complaint about the printing is the large number of dotted lines used which is noisy and slows down production.

In conclusion the *BuSIness Duo* is a nice suite of programs which perform well within the limitations of the system. You must, though, look carefully at the nature of your intended use to assess whether it has the capacity to meet your requirements.

Roger Carus


AMX Mouse: children love it

Mouse heading for schools

ONE OF the most versatile and interesting packages to come on to the market recently is the AMX Mouse – a means of communicating with the computer via a small roller unit which sits on the workspace next to the machine (see the review in the April issue). As the mouse is moved, so the cursor will move about the screen, performing various functions according to the icon mode selected.

What are icons? They are small pictures – graphical representations of operations that the computer can perform – which are printed around the border of the screen. By moving to the relevant icon and pressing the execute button on the mouse the mode, be it drawing, spray painting, fill, circle drawing or whatever, may be selected. If you have seen the Macintosh in operation you will have witnessed a very similar facility on that machine.

Try to see a mouse in operation if you are interested in the production of graphic materials for use in the classroom, or indeed for use by the children who take to it with great enthusiasm and alacrity. You will not be disappointed!

First readers

A SERIES of first readers in computing entitled 'Data Log' has just been published by Collins. There are books with questions to be answered, pictures to be drawn and programs to be written into the space provided. They are priced at £2.95 and deal with a wide range of computers including the BBC micro.

Commentary by Nick Evans, who welcomes reader feedback



Choosing the right Logo for your classroom

LOGO USERS are now having difficulty in choosing which version to use in their classrooms because of the number of products available.

How to choose is always a problem and the usual rule holds true in this case – see it before you buy, if possible.

The main factors involved in deciding on which Logo version to buy are related to ease of use, flexibility and speed. In terms of the language itself an indication of how wide-ranging the package is can be seen by the number of 'primitives' (standard commands) that are available to the user. Also the editing facilities should be easy to use and clear. The speed of operation should enable the user to create complex programs which will still run smoothly and at an acceptable pace.



List processing should be available so that advanced programming may be undertaken and there should be room for the user to grow and not be limited by the facilities.

The Acornsoft Logo reviewed in this and the December 1984 issue of *Acorn User* fulfils many of these objectives and represents a comprehensive and well-structured version of Papert's original vision.

Others are available however – notably Logotron, which is marketed through Tecmedia (see page 65). This has, much to Acornsoft's chagrin, proved to be a much faster implementation of the language with benchmark tests showing vast advantages in speed over the Acornsoft version. Added to this there is a sprite board now available for Logotron which enables children to program machine-code style 'action-graphics'. A further advantage for those who use their micro for many purposes is that Logotron comes on a single 16k chip whereas the Acornsoft implementation comes on two chips, which either means the use of an expansion board or no wordprocessor, *Disc Doctor* etc.

But don't despair if you have already purchased your Acornsoft version. Logotron and Acornsoft are at the moment the leaders in the field and each has its own advantages. The lack of speed in the Acornsoft Logo is well compensated for by the range of extensions with abilities to 'hatch' up to 32 multiple turtles, drive printers of different types, interface with a variety of floor turtles and communicate with other external peripherals. The breadth of primitives is also remarkable – well over 200 of them. Doubtless the battle will develop between these two companies with software spin-offs from both sides to entice or placate the users.

● See Joe Telford's comparison of four Logos on page 65.

Acorn to set up schools hotline

AS THE national leader in the supply of computers to schools, Acorn is following up its 'Micros in Schools' scheme with more support to the many Acorn users in education.

A Suppliers' Forum has been set up 'where educationalists can present their needs – new types of equipment, new software etc – to the industry as a whole, all working together to help make schools make the best use of their resources'.

An Educational Hotline is also to be created which will supply information and help about projects and problems within the education field. And finally, attractive price deals are to be set up for 'financially hard-pressed schools' to equip themselves more speedily.

One just hopes that the recent changes at Acorn will have no effect upon these proposals since they will be welcomed by schools and colleges (most of which generally consider themselves to be 'financially hard-pressed' these days) if they come to fruition.

Network system from Richmead

A NETWORK system which interfaces up to 16 BBC micros to a single RML 380Z is available from Richmead Micro.

Many schools started microcomputing with the 380Z which then became redundant with the advent of the Beeb. However, when a proposal is made for a network within a school, this leads to the expense of another micro to act as the main terminal for disc and printer access.

If the 380Z is available, then, at £275 plus £20 per BBC station, this network offers considerable financial advantages over the other options currently on offer. Disc access is slower than normal but is much quicker than tape and the system is totally compatible with popular BBC micro programs such as *Wordwise* and *View*.

Contact Richmead Micro, 29 Easby Way, Lower Earley, Reading RG6 3XA, tel: (0734) 665771.

New applications for the Beeb please Acorn

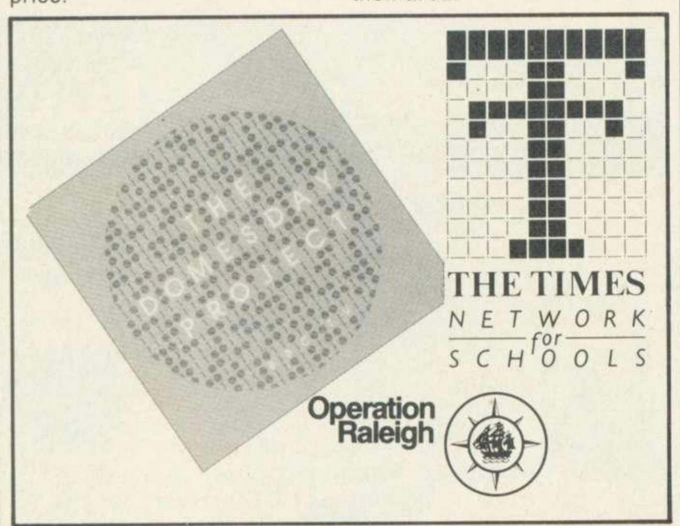
ACORN is naturally delighted by the number of 'adventurous applications' the BBC micro has been put to – the new Domesday Book, Telesoftware, Operation Raleigh (which is using a lab of Beebs to monitor the progress of the expedition), as well as experiments in satellite communications and a proposed environmental database in partnership with the World Wildlife Fund.

Another major venture that is nearer home for most of the readers of this column is The Times Network for Schools (TTNS), which is based on the Telecom Gold system of communication provided by British Telecom. Normally quite expensive, although very flexible, this makes the Gold system available for schools to use at a fraction of the normal price.

A comprehensive database is being created about curricular and extra-curricular subjects, and careers advice is on offer as well. Inter-school communications are also available, allowing the exchange of information between groups and for administrative purposes in the school.

There is a once-only charge of £125, then it costs £69 per term per mailbox, which is a huge discount on normal rates. Included in this price comes all the hardware and software necessary, as well as a Tutor program and operating manual.

Education authorities are taking the initiative on these offers and schools should contact their micro-electronics advisers or the education offices direct to find how the scheme is administered in their area.

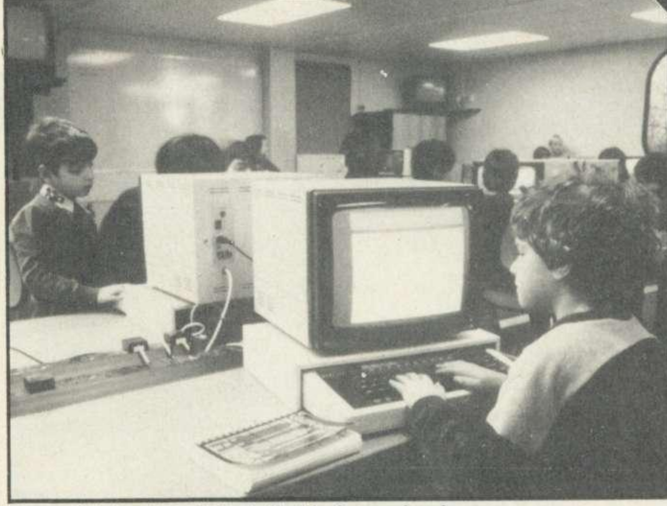


Toad leaps to the aid of Wordwise users

HAVE YOU ever been frustrated by the 'Disc full' message when using *Wordwise* and *Edword*, knowing there's still loads of room left? The user is limited by the Beeb's filing system, which allows only 32 files per disc, but Toad Educational Computing has come up with the *Wordwise* Menu Disc, which allows up to 52 files and provides a catalogue of the files on screen with a description of the contents of each. No more file searching because you can't remember what was in 'GVN3/12'!

Toad also supplies a timetable administrator package and school database. Toad Educational Computing, 8 Westbourne Grove, Sale M33 1RP, tel: 061-969 4740 (Prestel as phone number without the first 0).

84 66 79 78 84 66 84 73 84?



Computalab: already installed in four schools

Look out for ready-made computer classrooms

FOR SCHOOLS with the money and the will to get ahead of the field, it may be worthwhile investigating the purpose-designed Computalab. This facility offers 12 workstations and a teaching station – all Beebs – linked together by Econet.

The teaching station includes a file-server, dual disc drive and an ink-jet printer, plus two large overhead monitors to give clear visibility for demonstration work. All of this is housed in a prefabricated building of attractive design which requires only basic ground preparation.

Naturally, the price is high but the compensations are great. How many schools have their computers ill-organised in ordinary classrooms with workspace cobbled together by the staff on a makeshift basis? The problems of wandering leads and extensions and the vagaries of the power supply running from dubious extensions all pose not only difficulties but also dangers within the computer room.

This is the ideal solution – already being used in four schools and probably more by the time of going to press. If your school or LEA is interested contact Elliot-Medway Ltd, FREEPOST, Glebe Court, Peterborough PE2 8BR, tel: (0733) 52151.

Schemes at your service

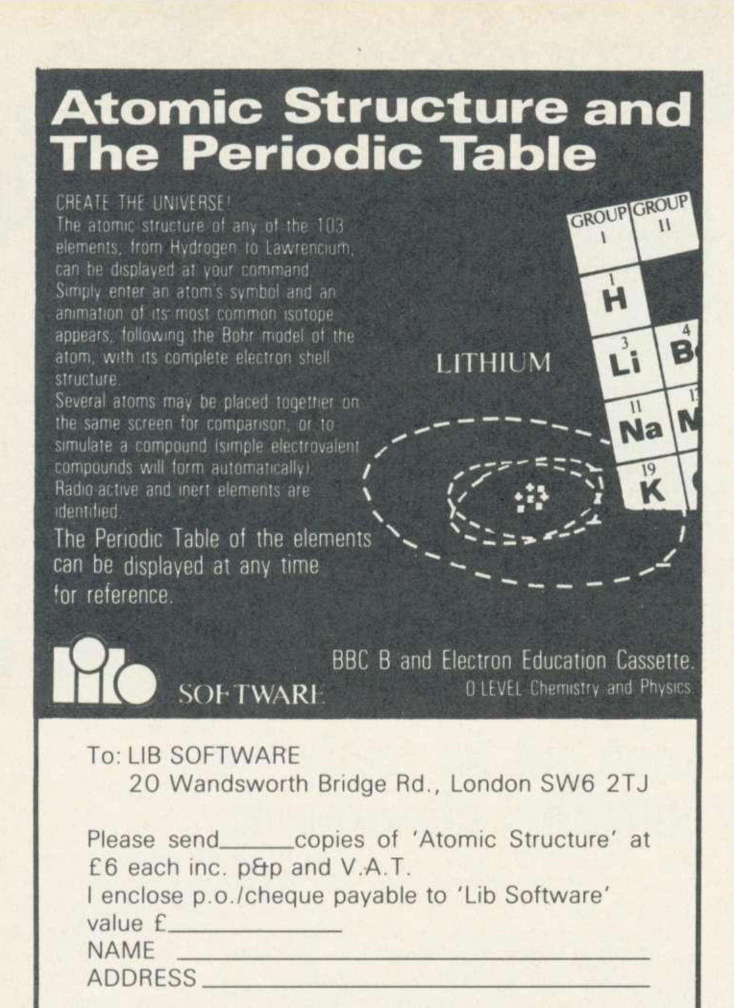
MAINTENANCE can be a nightmare in schools or colleges with many micros. Servicing is expensive and so is consequently often undertaken by staff, who are already hard-pressed for time. Now several servicing schemes have come into existence and I'll document three of them here.

Cumana, the suppliers of many of the disc drives used in schools, has opened a servicing branch in Daventry. This deals not only with drives but also with computers and all associated peripherals. As an example of prices the minimum charge for a BBC B is £18 and £16 for dot matrix printers. Bear in mind this is simply a repair service and not a servicing scheme.

Simnett Computers offers a similar service with comparable prices.

The Micro Repair Club offers an insurance scheme whereby, for an annual premium, the poorly micro will be repaired free of charge. One year's membership is £24.95, with a renewal charge of £14.95 per year after that. Schools must pay the full charge for the first four micros but thereafter will pay £19.95 per micro. The only additional cost is the price of postage to the repair centre. If premiums are paid for two or more years in advance there is an additional discount.

Full details are available from: Cumana, Daimler Close, Daventry NN11 5QJ, tel: (03272) 79494. Simnett Computers, Unit 14, St George's Industrial Estate, Kingston KT2 5BQ, tel: (01) 541 1495. Micro Repair Club, Swan Court, Mansel Road, Wimbledon SW19 4AA, tel: (0990) 28102.



HIGH TECH-HIGH RISK!

Protect and secure your valuable equipment.

Lock it or lose it...

Tidybase Housings, Covers, Locking Systems for Computers, Disc Drives, Monitors, Printers, Video Recorders etc.

Features include unique new Locking System (patents pending) with optional alarm back-up giving protection without restricting normal operation.

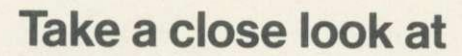
Standard specialised systems available.

Range includes Turntables and computer based Work Stations for the handicapped.

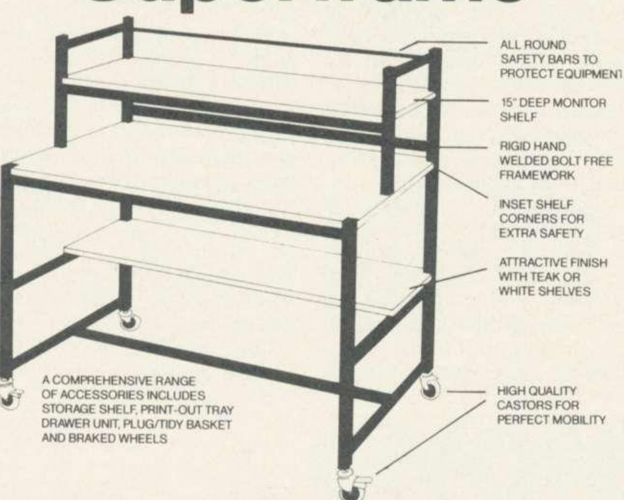
Find out more from . . .



3 Over Links Drive,
Poole, Dorset BH14 9QU.
Tel: (0202) 708404.
Telex: 418297



Klick Superframe



The Klick range of school furniture has an application in all areas of the school from computers and AVA's to storage equipment and OHP's. Please contact us for our current product catalogue.

Store Stock Systems, Unit 2B, Stag Industrial Estate, Atlantic Street, Altrincham, Cheshire WA14 5DD Telephone 061-928 5388 Telex 667416

Educational Software





BBC Micro
Electron
Tapes, 40/80 track discs, Econet compatible.
Commodore 64
ZX Spectrum unexpanded
Vic
ZX 81
Apple
PET
Dragon (book only)
All software for the above computers

IMMEDIATE DISPATCH

MICRO ENGLISH (BBC, Electron). Complete English Language self-tuition and revision course, to O'level, of 24 programs. Includes "speak-and-spell" with real voice (no extras required). £24.50.

MICRO MATHS 24 program revision or self-tuition course to O-Level. £24.50 (except ZX81 £12.00).

PICTURE PUZZLES WITH LIGHT PEN (BBC, Electron). Educational tests for infants, using light pen to select colour 3D pictures. £6.50 (Light Pen £18.00).

ANIMATED ARITHMETIC Teaches using moving colour pictures (not words). Ages 3-8. £6.50 (discs £7.50).

BRAINTEASERS Book of IQ tests and puzzle programs £5.95.

"Excellent". EDUCATIONAL COMPUTING.

***Immediate dispatch** Micro Maths, Micro English and Master Maths. Phone or send orders or requests for free catalogue (200 programs) to:

World leaders in educational software (distributors in 24 countries).

LCL
Department A
26 Avondale Ave.
Staines, Middx.
Tel: 0784 58771
24 hrs. Orders




TRADE, ENQUIRE ABOUT HOT LINE

AS SEEN ON TV

SOFTWARE GUIDE

Our list, compiled by Nick Evans, will help you track down the educational software you're looking for. Turn to page 153 for the publishers' addresses.

TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
1914	Camb Micro Soft	£15	BBC B	Sec,	h,s
3D Transformation	Muse	£10	BBC A	Sec,	gg
Accidents Datafile	RoSPA	£5	BBC B	Factfile,	u
Accounts	Heinemann	£14	BBC B	Sec,	d
Acoustics	Longman	£14	BBC B	Sec,	p
Action Science	Franklin Watts	£11	BBC B	Jun/Sec,	i,p
Action of the Heart	Garland	£11	BBC B	Sec,	b,s
Additional Fun	Shiva	£14.95	BBC A	Inf/Jun,	a
Advanced Programming	Addison-Wesley	£10.30	BBC B	Sec,	i
Adventure Story	ESM	£11	BBC B	Jun,	e
Adventure Storywrite	ESM	£7.95	BBC B	Inf,	e
Airport	Gibsoft	£6.75	BBC B	Sec,	dd,cc
Algebra 'O'	Ampalsoft	£5.13	BBC B	Sec,	m
Algebra Progs	Acornsoft	£9.95	BBC A	Sec,	m
All Fingers Go	NEC	£14.95	BBC A	Jun,	t
Alphabet	Opalsoft	£9.95	BBC B	Inf,	v
Alphachopper	Sulis	£9.95	BBC B	Inf,	v
Aluminium Plant	Longman	£14.50	BBC B	Sec,	s
Amplification	Mega Sci Cal	£12	BBC/ Electron	Sec	
Anagram	Edsoco	£4.95	BBC A	Inf/Jun,	e
Angle	Chalksoft	£11.25	BBC A	Jun/Sec,	m
Angle Tutor	Pee Bee	£9.95	BBC A	Jun/Sec,	m
Angles	Garland	£7	BBC B/ Electron	Jun,	m
Animal, Veg, Min	Bourne	£8.95	BBC B	Jun,	q
Animated Arithmetic	LCL	£6.50	BBC A	Inf,	a
Answer Back (Junior)	Kosmos	£10.95	BBC B/ Electron	Jun/Sec,	q
Answer Back (Sen)	Kosmos	£10.95	BBC B/ Electron	Sec,	q
Answer Back Sports Quiz	Kosmos	£9.95	BBC/ Electron	Sec,	
Approx, Estimation and Standard Form	Heinemann	£14.38	BBC B	Jun/Sec,	m
Arithmetic	Schoolsoft	£12	BBC B	Inf,	a
Arithmetic 'O'	Ampalsoft	£5.13	BBC B	Sec,	a
Arithmetic Plus	Daco	£5.95	BBC B	Jun/Sec,	a
Astronomy	BBC Soft	£9.20	BBC B/ Electron	Sec,	z
Astruct	MUSE	£7	BBC B	Sec,	p
Atoms	Weaversoft	£7.95	BBC B	Sec,	p
Attack on the Somme	Tressell	£13.99	BBC B	Sec,	h,s
Audio	SESS	£8	BBC B	Special,	e
Author	ESM	£30	BBC B	Jun/Sec,	jj
Aztec & Masterword	ESM	£6.95	BBC B	Jun/Sec,	v
B/Tec Record Keeper	Social Science	£15	BBC B	Teacher,	dd
BBC Logo	Logo Software	£59	BBC B ROM	Inf/Jun,	o
Ballard	Ed Soft	£3	BBC A	Jun,	a,q
Balloon	Englefield	£6.25	BBC B	Jun,	v
Balloon Lander	Gibsoft	£3.95	BBC B	Inf/Jun,	x
Bar and Pie Charts	Tom Shipman	£7.99	BBC B	Jun/Sec,	u
Barrage	Micro Power	£7.95	BBC B	Sec,	p,s
Basic Sound and Graphics	Addison-Wesley	£10.30	BBC B	Sec,	i
Basic Statistics	Arnold	£27.50	BBC B	Sec,	s
Bearings	Bryants	£5.10	BBC B	Sec,	g
Beat the Bus	Solent	£8	BBC B	Jun,	s,ee
Beebshop (Barcodes)	Alpha Computer	£25	BBC B	Jun/Sec,	i
Beeline	Cambs. Ed. Comp	£16	BBC B	Jun/Sec,	w
Beep-beep	IJK	£4.50	BBC B	Inf/Jun,	k

TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
BelBase	BelTech	£18	BBC B	Jun/Sec,	dd
Bell	Muse	£5.50	BBC B	Jun/Sec,	p,s
BelPlot	BelTech	£9.50	BBC B	Sec,	m
Bestfit	Greenwood	£5	BBC B	Sec,	m,p
Beyond Basic	BBC	£11.50	BBC A	Sec,	i
Bio Wood	Solent	£9	BBC B	Jun/Sec,	b,s
Biology	Longman	£20	BBC B	Sec,	b
Biology	Nelcal	£23.50	BBC B	Sec,	b
Biology	Tom Shipman	£7.99	BBC B	Sec,	b
Biology Revision	Abacus	£12.95	BBC B	Sec,	b
Biomass	Longman	£14.50	BBC B	Sec,	b
Bioscience	IRL Press	£19.95	BBC B	Sec,	b
Blockbuster	Argus Press	£8.95	BBC B	Inf,	x
Blood Circulation	Garland	£11	BBC B	Sec,	b,s
Blood Sugar	Longman	£14.50	BBC B	Sec,	b
Body Processes and The Fate of Protein	Garland	£10	BBC B	Sec	b
Brainteasers	LCL	£5.95	BBC B	Jun/Sec,	q
Break-in	Highlight	£7.95	BBC B/ Electron	Inf/Jun,	v
Bridges	Fernleaf	£9.95	BBC B	Jun	a
Britain	Datapen	£5.95	BBC B	Sec,	g,q
British Cities	Schoolsoft	£8	BBC B	Jun/Sec,	g,q
Bstar	MUSE	£7	BBC B	Inf/Jun,	n
Business Games	Acornsoft	£9.95	BBC A	Sec,	d
C Rules	Ed Soft	£5.95	BBC A	Inf,	e
CAD	Heinemann	£16.50	BBC B	Sec,	bb
Calculus 'O'	Ampalsoft	£5.13	BBC B	Sec,	m,q
Call Your Bluff	Square	£7	BBC B	Jun/Sec,	e,q
Campaign	Longman	£14.50	BBC B	Sec,	h,s
Can You Make It?	Fernleaf	£9.95	BBC B	Jun	
Capacitor	Longman	£14.50	BBC B	Sec,	p,s
Capital Letters	Chalksoft	£11.25	BBC B	Inf,	w
Capitals	Chalksoft	£9.95	BBC B	Inf,	w
Capitals	Square	£7	BBC B	Jun/Sec,	g,q
Capitals 1	Ed Soft	£5.95	BBC A	Inf/Jun,	w,q
Caravan Trek	Pee Bee	£10.95	BBC A	Jun,	s
Carousel	Schoolsoft	£5	BBC B	Jun,	k
Cartesian	Flite	£24.90	BBC B/ Electron	Sec,	m,u
Cat and Mouse	Kingfisher	£6.90	BBC B	Jun,	a
Catchapple	Kingfisher	£6.90	BBC B	Inf/Jun,	a,q
Census Analysis	Longman	£37.50	BBC B	Sec,	u
Chemical Analysis	Acornsoft	£10.20	BBC B	Sec,	c
Chemical Calculation	Ardsoft	£6	BBC B	Sec,	c
Chemical Collisions	Camb. Micro Software	£15	BBC B	Sec,	c
Chemical Element	Longman	£14.50	BBC B	Sec,	c
Chemical Equations	Garland	£9.57	BBC B	Sec,	c
Chemical Simulations	Acornsoft	£13.80	BBC B	Sec,	c,s
Chemical Structures	Acornsoft	£13.80	BBC B	Sec,	c
Chemistry	Garland	£12.95	BBC B	Sec,	c
Chemistry	Micro Power	£6.95	BBC B	Sec,	c
Chemistry Revision	Abacus	£12.95	BBC B	Sec,	c
Chemistry Software	Pitman	£19.95	BBC B	Sec,	c
Children from Space	ASK	£9.95	BBC B/ Electron	Jun,	e,v
Choicemaster	Wida	£25	BBC B	Teacher,	jj
Chords	Aztec	£6.50	BBC B	Jun/Sec,	m
Chromosome Mapping	Garland	£10	BBC B	Sec	b
Circuits-diodes	Garland	£11	BBC B	Sec,	p,s
Circuits-switches	Garland	£11	BBC B	Sec,	p,s

TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Circular Flow of Income	Longman	£14.50	BBC B	Sec,	d
Classmaster	Logical	£20	BBC B	Teacher,	dd
Claws	Bryants	£5.10	BBC B	Jun,	n,q
Cleverclogs	Computertutor	£6.50	BBC B	Jun,	e,q
Climate	CET	£14.38	BBC B	Sec,	g
Climate	Heinemann	£12.50	BBC B	Sec,	g,cc
Clock	Solent	£8	BBC B	Inf,	x
Clogo	Addison-Wesley	£29.95	BBC B	Jun/Sec,	o
Clown	Englefield	£6.25	BBC B	Jun,	e,v
Cloze	GED	£4.50	BBC B	Jun/Sec,	v
Cloze Procedure	Bryants	£5.10	BBC B	Jun/Sec,	v
Co-ordinates	Garland	£7	BBC B/ Electron	Jun,	m
Co-ordinates and lines	Garland	£7	BBC B	Jun,	m
Collector's Catalogue	Acornsoft	£10	BBC B	Jun/Sec,	dd
Collisions	Longman	£14.50	BBC B	Sec,	p,s
Colour	MUSE	£6.50	BBC B	Jun/Sec,	x,gg
Colour Matching	SESS	£10.35	BBC B	Inf,	x,gg
Colouring Book	Addison-Wesley	£9.95	BBC B/ Electron	Jun,	gg
Comatch	Clares	£4.95	BBC B	Inf,	x,gg
Communication	Britannica	£75	BBC B	Jun/Sec,	e,ee
Communitel	IT Consultancy	£45	BBC B	Sec,	dd
Compete	Arnold	£15	BBC B	Sec,	b
Comp-u-Cater	Shumwari	£24.95	BBC B	Sec,	dd,ff
Compounds	Longman	£14.50	BBC B	Sec,	c
Comprenez	Heinemann	£14	BBC B	Sec,	l,q
Computer Application	Addison-Wesley	£39.95	BBC B	Sec,	i,s
Computer Club	MacDonald	£3.95	BBC B	Jun/Sec,	ee
Computer Logic	Darwood	£8.50	BBC A	Sec,	i
Computer Programme	BBC Soft	£10	BBC B	Sec,	i
Computers Information, Awareness	Pitman	£17.95	BBC B	Sec,	i
Concept Collection	Greenwood	£6.50	BBC B	Special,	
Constellation	Micro Power	£6.95	BBC B	Sec,	z
Construction	Ampalsoft	£6.95	BBC B	Sec,	m
Construction 'O'	Ampalsoft	£5.13	BBC B	Sec,	
Copywrite	ESM	£10.95	BBC B	Jun/Sec,	v
Corn Cropper	CCS	£6.99	BBC A	Sec,	d,s
Cost Benefit Analysis	Longman	£14.50	BBC B	Sec,	e
Coucapcur	Ed Soft	£4.95	BBC A	Jun,	g,q
Count	Clares	£4.95	BBC B	Inf,	a
Count with Oliver	Mirrorsoft	£7.95	BBC B/ Electron	Inf,	a
Countdown	AVC	£3	BBC B	Inf/Jun,	a,q
Counter-currents	Longman	£14.50	BBC B	Sec,	p
Counters	MUSE	£5.50	BBC B	Inf/Jun,	a
Counties	Bryants	£5.10	BBC B	Jun/Sec,	g
Counting	Garland	£8.65	BBC/ Electron	Inf	a
Countries	Hewson	£7.95	BBC B	Sec,	g
Cranky	ASK	£8.65	BBC B/ Electron	Jun,	n
Creative Graphics	Acornsoft	£9.95	BBC A/ Electron	Jun/Sec,	gg
Crocodiles	Bryants	£5.10	BBC B	Inf,	n
Crossed Words	Aztec	£6.50	BBC B	Inf/Jun,	e
Cruiser	Learnwell	£4.99	BBC B/ Electron	Jun,	
Crunch	Greenwood	£5	BBC B	Inf/Jun,	a
Cunning Running	Jacaranda Wiley	£14.95	BBC B	Jun/Sec	s
Current Electricity	Mega Sci Cal	£9.95	BBC/ Electron	Sec,	
DNA Structure	Garland	£16.50	BBC B	Sec,	b
Dart	AUCBE	£13	BBC B	Jun/Sec,	o
Das Schloss	Chalksoft	£9.25	BBC A	Sec,	l,q
Data Processing	Pitman	£19.95	BBC B	Sec,	i
Dataquiz	Bryants	£4.85	BBC B	Jun/Sec,	q
Datext	Optima	£9.95	BBC B	Jun/Sec,	y
Decimals	Chalksoft	£9.25	BBC B	Jun,	a
Decisions	Shiva	£14.95	BBC B	Inf,	e
Deliver the Message	Fernleaf	£9.95	BBC B	Jun/Sec	
Density	Acornsoft	£11.90	BBC B	Jun,	p
Developing Cities	Thomas Nelson	£23.50	BBC B	Sec,	s,g
Dictionary	Daco	£13	BBC B	Jun,	e
Die Prinzessin	Aztec	£6.50	BBC B	Sec,	l,q
Diet	CUP	£13.95	BBC B	Sec,	ff
Dieting	Garland	£11	BBC B	Sec,	ff
Digital Logic Functions	Mega Sci Cal	£12	BBC/ Electron	Sec,	
Directed Numbers	Garland	£7	BBC B/ Electron	Jun,	a

TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Discounted Cash Flow	Social Science	£15	BBC B	Sec,	d
Discovery	Learnwell	£9.50	BBC B/ Electron	Jun/Sec,	
Disraeli	Longman	£14.50	BBC B	Sec,	h
Distances	Micro-aid	£4.95	BBC B/ Electron	Jun,	g
Dominoes	Garland	£6.95	BBC/ Electron	Jun,	
Dnumb	MUSE	£8	BBC B	Inf/Jun,	a
Drawing	BBC	£10	BBC A	Jun/Sec,	gg
Drumkit	Quicksilva	£9.95	BBC B	Jun/Sec,	k
Dynamic NMR	Microwave	£9.50	BBC B	Sec,	c
Early Language	SESS	£8	BBC B	Special,	e
Early Learning	BBC	£10	BBC A	Inf,	m,e
Early Reading	ESM	£9.50	BBC B	Inf/Jun,	e
Early Series	H&H	£6.50	BBC B	Inf,	v
Early Years 1 and 2	Orion	£7.95	BBC B	Inf,	m,e
Earlynum	Bryants	£5.10	BBC B	Inf/Jun,	a
Earthquake	Soft Warehouse	£9.95	BBC B	Inf,	v
Easiplot	Synergy	£15.95	BBC B	Teacher,	m
Ecology	Garland	£16.50	BBC B	Sec,	b
Economics	Longman	£14.50	BBC B	Sec,	d
Economics	Sigma	£25	BBC B	Sec,	d
Edfax	Tecmedia	£23.88	BBC B	Jun/Sec,	gg
Edmaster	RH Electronics	£12.95	BBC B	Jun/Sec,	q
Education	Simonsoft	£6.95	BBC B	Jun/Sec,	
Educational	Golem	£8	BBC B/ Electron	Inf/Jun,	e,m
Edword	Clwyd Technics	£15	BBC B	Sec,	aa
Egg Production	Crystal	£25	BBC B	Jun/Sec,	d,s
Eiffel Tower	Chalksoft	£9.25	BBC B	Sec,	l,q
Election Programme	Social Science	£39.50	BBC B Disc	Sec,	d
Electrical Impedence	Longman	£14.50	BBC B	Sec,	p
Electronic News	Notts.Ed.Supp.	£15	BBC B	Jun/Sec,	dd
Electrons	MUSE	£6.50	BBC B	Sec,	p,s
Electrostatics	Garland	£11	BBC B	Sec,	p
Elementary Stats	Garland	£7	BBC B/ Electron	Jun,	u
Elements and Compounds	Garland	£11	BBC B	Sec,	c
Energy Crisis	Social Science	£15	BBC B	Sec,	d
Engines	Arnold Wheaton	£6	BBC B	Sec,	j
English Literature	Akadimias	£9.95	BBC B	Sec,	e
Enzkin	Arnold	£15	BBC B	Sec,	b
Estimation	Hodder & Stoughton	£30	BBC B	Inf/Jun,	m
Euclidean Geometry	Impact	£9.95	BBC B	Sec,	m
Europe Rally	Tom Shipman	£7.99	BBC B	Jun/Sec,	g,q
European Geography	Micro Power	£6.95	BBC B	Sec,	g
European Studies	Aztec	£6.50	BBC B	Sec,	g,q
Evolut	Arnold	£15	BBC B	Sec,	b
Examiner	Acornsoft	£9.95	BBC B	Teacher,	q
Exploration	Heinemann	£33	BBC B	Jun,	ee
Eye	Longman	£14.50	BBC B	Sec,	b
Eye for Spelling	ESM	£8.95	BBC B	Inf,	v
Facemaker	ASK	£9.95	BBC B/ Electron	Inf/Jun,	gg,e
Factfile	Camb. Micro Software	£15	BBC B	Jun,	dd
Factors and Fractions	Ed Soft	£5.95	BBC B	Jun,	a
Fairshare	Griffin	£7.35	BBC B	Jun/Sec,	
Farmer	Longman	£14.50	BBC B	Sec,	d,s
Female Reproduction	Garland	£12	BBC B	Sec,	b
Field Line Simulation	Garland	£11	BBC B	Sec,	p
Find the Lady	Fernleaf	£9.95	BBC B	Jun/Sec	
Find the Question	Fernleaf	£9.95	BBC B	Jun	a
Find your Bearings	Solent	£9	BBC B	Jun/Sec,	q
Firefight	Highlight	£7.95	BBC B/ Electron	Inf,	v
First Steps with the Mistermen	Mirrorsoft	£8.95	BBC B/ Electron	Inf,	v
Fixed exchange Rates	Longman	£14.50	BBC B	Sec,	d
Fizz-buzz	Bourne	£4.50	BBC B	Jun/Sec,	a,q
Flags	Micro-Aid	£4.95	BBC B/ Electron	Jun/Sec,	q
Flanders	Focusplan	£7.95	BBC B	Teacher,	hh
Fletcher's Castle	Fernleaf	£9.95	BBC B	Jun	h
Flight Path	Storm	£17.65	BBC B	Jun/Sec,	s
Floater	Camb. Micro Software	£15	BBC B	Sec,	p
Flower	Longman	£14.50	BBC B	Sec,	b,s
Flowers of Crystal	4mat	£18.40	BBC B	Jun,	e,s
Fol-de-rol	Sulis	£9.95	BBC B	Inf/Jun,	e,q

FOR CONNOISSEURS
OF ACTION, LEISURE OR LEARNING
BBC Electron

ANSWER BACK Sports Game £9.95
(ages 14 and over)
Challenge the KOSMOS team at football or tennis. But be warned, we don't lose easily...
- NEW RELEASE Whatever your sport, this program probably knows a lot more than you do!

ANSWER BACK Junior £9.95
(ages 6 to 11)
Defeat the dragon and save the princess of KOSMOS Castle...
- a superb program with vast potential... (A & B Computing, November 1984)



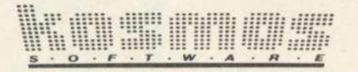
ANSWER BACK Senior £9.95
(ages 12 and over)
Outwit the KOSMOS robot and destroy the alien invaders...
- superb program... (Personal Computing Today, October 1984)

IDENTIFY EUROPE £7.95
(for all ages)
Solve the European jigsaw puzzle by land or sea...
- NEW RELEASE Discover Europe without leaving your home!

The IDENTIFY EUROPE program provides a fascinating way of discovering and learning the geography of Europe. The program will provide hours of amusement for all the family and everyone is sure to benefit from it.

The ANSWER BACK series needs little introduction. Each program combines a massive wealth of information with a fascinating and compelling game. The Senior and Junior quizzes each contain 750 questions and 3000 optional answers on General Knowledge. The Sports program is even larger containing a mind-bending 800 questions on Sport and two high-speed machine code games - Football and Tennis. But that's not all. For quiz fans, full facilities are provided for creating and saving new quizzes or modifying those supplied - and you don't need to be a programmer!

KOSMOS SOFTWARE LTD
1 Pilgrims Close, Harlington, DUNSTABLE, Beds. LU5 6LX
Tel. (05255) 3942



Dealers, contact Lightning, Microdeal, Proteus or Tiger.

Please supply the following programs for the BBC/Electron computer

ANSWER BACK Sport @ £9.95 ☐ ANSWER BACK Junior @ £9.95 ☐
IDENTIFY EUROPE @ £7.95 ☐ ANSWER BACK Senior @ £9.95 ☐

Mr/Mrs/Miss ....
Address ....
.... Postcode ....

Orders are normally despatched within 48 hours

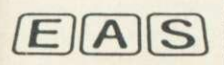
KOSMOS SOFTWARE LTD. 1 Pilgrims Close, Harlington, DUNSTABLE, Beds. LU5 6LX Tel. (05255) 3942

ADMINISTRATOR'S FRIEND
MODULAR COMPUTER ASSISTED SCHOOL ADMINISTRATION

1. BASIC PACKAGE – LISTS/OPTIONS ETC
2. EXAM ENTRIES/PUPIL DATABASE
3. TIMETABLING

Excellent print outs in a variety of formats further information/sample print outs/order form.

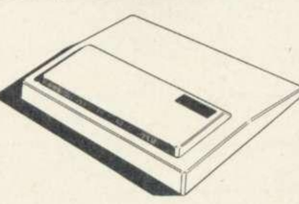
Please Contact: JOHN CALLAGHAN



EDUCATIONAL ADMINISTRATION SOFTWARE
SOMERVILLE HOUSE
BRUNSWICK ROAD
MANCHESTER M20 9GA
Tel: 061-445 1379

SUPERB HARD COVERS
for your BBC Micro & Electron

- Engineered in top quality high impact ABS – very tough.
- Super textured finish in cream to tone with your BBC Micro.
- Looks good in the home.
- Gives excellent protection.
- Ideal for schools and colleges.



BBC Cover: **£10.95** (+£1.55 p&p)
Electron Cover: **£8.95** (+£1 p&p)

Send cheque/PO to:
Dept. MU2
Grange Close
Sandbach
Ches. CW11 9ET
Tel: (09367) 3098



RESOURCE FACILITIES
Specialist Academic, Educational & Business Software for the BBC microcomputer. Northern Distributor for Viglen Computer Supplies. Official Acorn dealer.

PANEL (8k ROM) – This powerful and versatile utility has been designed for the serious assembly language and machine-code programmer. It is the ideal complement to the on-board assembler. All the options of 'front-panels' on other educational micros together with many extra features, including:
*Register and memory display and modification. *Disassembler. *Single-stepping and break points. *Offset calculator. *Intelligent block moves. ROM . . . £20.00

MICROBA – A biology adventure game in which you can wander around the blood, respiratory system, urinary system and alimentary canal of a typical human being. Cassette £6.00. Disc £7.00

CATB – 'Computer Assisted Tables Bingo'. A novel and enjoyable way of learning multiplications tables. Class set of 30 bingo cards plus program. Cassette £10.00. Disc £11.00

REGRESS – 'Lines of Best Fit' Regression analysis. A powerful graphical program. Linear/Logarithmic/Inverse scaling. Up to 58 points. Remove the worst point. Print results. Cassette £8.00 Disc £9.00

ORDER – A graphic display of 8 major sorting routines: Bubble, Decrementing-wave Ripple, Cocktail-shaker, Straight Insertion, Delayed Replacement, Shell-Metzner, Heapsort, Quicksort. Incorporate procedures in your own programs. Cassette £6.00. Disc £7.00

DISKIT – STAT: a detailed report on the program size and status of each surface of your discs. Clear single screen display. Print option. EZICOPY: single copying of all programs from catalogue – menu-driven. RENAME extensions. Disc £5.00

RESMAN – A resources management package. An ideal disc-based filing system for all your resources. Helps you keep track of what you should have. Disc £9.00

VIEW Printer-driver: Juki 6100, Sanple 2000, Quendata DWP, Epson FX/RX/MX3/DX Canon PW, KAGA Taxan KP, Brother HR15. Disc £5.00

16 + ALGEBRA – A suite of 10 programs to assist in the teaching and learning of Algebra at O level & 16+. An excellent revision aid. Written by an experienced schoolmaster. Disc £10.00

SIMPLE SENSORS for the A-D port. Simple unit plus notes on application and programs. Light £12.00, Sound £13.00, Temperature £11.00, Touch £11.00

N.B. *In addition to our software for the BBC microcomputer, we also stock a comprehensive range of Hardware, Media and Accessories: Viglen disc drives, Monitors, Printers, Discs, ROMS, Expansions, Filing systems.*

ALL PRICES EXCLUDE VAT & CARRIAGE. Minimum carriage & packing £1.00.

Telephone (0422) 65935 for best prices on quality HARDWARE, FIRMWARE, SOFTWARE, MEDIA & ACCESSORIES.
Education Authority Orders welcome.
RESOURCE FACILITIES, MASTERS LANE, HALIFAX HX2 7DX



MOSAIC

Maths with a difference – bringing creativity to your classroom computer.



A simple design program that enables the creative exploration of basic mathematical concepts. It is very flexible and can be used for producing complex designs and tesselations as well as to introduce five year olds to making simple shapes and patterns.

BBC "B" and ELECTRON

Disc (specify 40/80)	£11.50	
and user guide		inclusive
Tape	£9.50	
Teachers' notes and planning sheets	0.50p	

Other titles available on request.

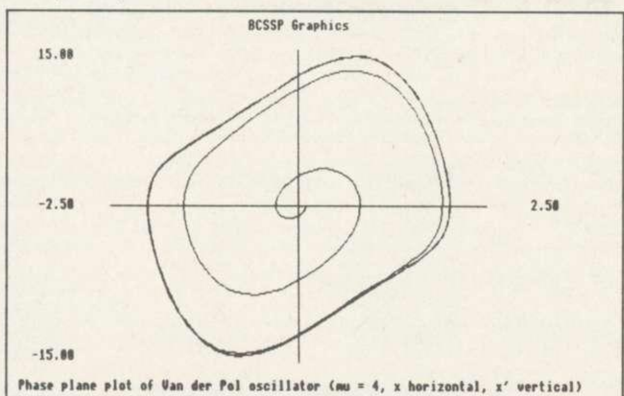
Hilditch Software, 4 Church Road, Felixstowe, Suffolk IP11 9NF.
Tel: Felixstowe (0394) 271747

BCSSP –

the dynamic system simulation language for BBC computers

- *describe systems by block diagrams and simulate their operations interactively*
- *applicable to differential and difference equations*
- *high resolution graphical/numerical output*
- *suitable for engineering, physics, economics, applied mathematics, electronics etc.*
- *use in education to bring differential equations alive*

Example response: Van der Pol Oscillator:



Phase plane plot of Van der Pol oscillator (mu = 4, x horizontal, x' vertical)

Write or phone for detailed brochure.
Demonstration system available at £20 inc. manual and tutorial.

MICRO PACS

Engineering Applications Software

Centre for Advanced Technology, Chilworth, Southampton, Hampshire SO9 1XB
Telephone (0703) 768956

AT LAST!

THE ANSWER TO FINDING GOOD QUALITY SOFTWARE FOR YOUR BBC/ELECTRON

THE BRAIN TRAIN CLUB



THE BRAIN TRAIN CLUB

EDUCATIONAL SOFTWARE FOR THE FAMILY

FOR ONLY £3 PER YEAR MEMBERS RECEIVE
Regular newsletter with full catalogue • Discount prices on all tapes & discs • Information and advisory service • Free postage for 3 or more titles • No obligation to purchase minimum number of tapes • Rapid Delivery

SPECIAL OFFERS THIS MONTH:—

EARLY LEARNING

COUNT WITH OLIVER Tremendous graphics on this MIRRORSOFT cassette provide an excellent introduction to learning maths for 3-7 YEAR OLDS.
BBC/ELECTRON — Normal price £7.95 **MEMBERS PRICE £5.45.** 40 Track Disc £8.45.

OLLIE OCTOPUS' SKETCH PAD This neat little graphics package from STORM should provide hours of creative enjoyment for 4-8 year olds.
BBC only — Normal price £6.95 **MEMBERS PRICE £5.95.** 40 Track Disc £9.95.

LOOK SHARP Sharpending the powers of observation is great fun with another offering from MIRRORSOFT with three programs for the VERY YOUNG and one on the second side to amuse and educate children UP TO THE AGE OF ELEVEN.
BBC/ELECTRON — Normal price £7.95 **MEMBERS PRICE £6.45.** 40 Track Disc £9.45.

JUNIOR

ANSWER BACK QUIZZES from KOSMOS should provide hours of fun whilst teaching general knowledge.
Answer Back Junior Quiz for 6-11 YEAR OLDS
Answer Back Senior Quiz for 11 YEAR OLDS
Answer Back Sports Quiz for ALL AGES.
BBC/ELECTRON — Cassette only. Normal price £9.95 **MEMBERS PRICE £8.45.**

SWINDLER An inspiring program from INTERFACE ASSOCIATES to teach mental arithmetic to 7-14 YEAR OLDS, who have to avoid being short-changed by shopkeepers on a shopping trip.
BBC only — Normal price £7.50 **MEMBERS PRICE £6.30.** 40 Track Disc £8.30.

BERT BOOT Squashing insects may not sound the most pleasant way to learn multiplication and division but this program from HIGHLIGHT SOFTWARE for 8-12 YEAR OLDS really is most enjoyable and rewarding.
BBC/ELECTRON — Cassette normally £4.95 **MEMBERS PRICE £3.95.** 40 Track Disc £5.95.

SENIOR

PENGUIN STUDY SOFTWARE A most useful series of programs for those studying Shakespeare at 'O' or 'A' Level to assist understanding of the texts. Titles available:— Merchant of Venice/Julius Caesar/Romeo & Juliet/Twelfth Night/Henry IV Part I/ Macbeth.
BBC/ELECTRON — Cassette only. Normal price £7.95 **MEMBERS PRICE £6.95.**

QUICK THINKING Imaginative games from MIRRORSOFT to sharpen mental arthimetic skills with a wide range of difficulty levels, making it suitable for ANYONE OVER 7 YEARS OLD.
BBC/ELECTRON — Cassette normally £6.95 **MEMBERS PRICE £5.45.** 40 Track Disc £8.45.

NOTE INVADERS This program from CHALKSOFT for 7 YEAR OLDS and over, provides entertaining practice at learning note recognition on the bass and treble clefs.
BBC/ELECTRON — Cassette normally £9.95. **MEMBERS PRICE £7.95.** 40 Track Disc £10.95.

DECIMALS A more serious program from CHALKSOFT, teaching and practicing the principles of the decimal system suitable for 9-15 YEAR OLDS.
BBC only — Cassette normally £9.25. **MEMBERS PRICE £6.45.** 40 Track Disc £10.95.

Annual Membership Fee of £3.00 if new member

To: BRAINTRAIN CLUB, NORTHINGTON HOUSE,
59 GRAY'S INN RD, LONDON WC1X 8TL.

Mr/Mrs/Miss ....

Full Address ....

....

Post Code .... Mem. No ....

TITLE	BBC/ ELECTRON	TAPE/ DISC	PRICE
Annual Membership Fee of £3.00 if new member			
P&P @ 50p per tape (Free if 3 or more ordered)			
PAYABLE TO FIRST BYTE COMPUTERS LTD TOTAL			

Non-members are welcome to buy at RRP

AU5

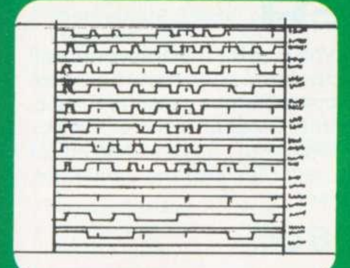
TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Followme	Edsoco	£5.95	BBC A	Jun,	q
Food	Heinemann	£33	BBC B	Jun,	
Forensic	AVC	£3	BBC B	Sec,	c
Formulae Game	Longman	£14.50	BBC B	Sec,	c
Forth	Acornsoft	£16.85	BBC B/ Electron	Jun/Sec,	i
Four in a Row	Dial	£6.50	BBC B	Jun,	
Frac	Tecmedia	£11.95	BBC B	Sec,	a
Frac Attack	Shards	£6.95	BBC B	Jun/Sec,	a
Fraci	MUSE	£8	BBC B	Jun/Sec,	a
Fraction Chase	GED	£4	BBC B	Jun,	a
Fractions	Garland	£7	BBC B/ Electron	Jun,	a
Fractions	Heinemann	£9.50	BBC B	Jun,	a
French	Acornsoft	£11.05	BBC B	Sec,	l
French	AVC	£3	BBC B	Jun,	l
French	Micro-aid	£7.95	BBC B	Sec,	l
French Connections	Camb. Micro Software	£15	BBC B	Sec,	l
French Mistress A	Kosmos	£7.35	BBC B/ Electron	Sec,	l
French Mistress B	Kosmos	£8.95	BBC/ Electron	Sec,	
French Tutor	Salamander	9.95	BBC B	Sec,	l
French Vocab	Hargreaves	£6.50	BBC B	Jun,	l
Frequency Response	Mega Sci Cal	£12	BBC/ Electron	Sec,	
Fun to Learn	Shards	£6.95	BBC B	Inf/Jun,	
Fun with Numbers	Golem	£8	BBC B/ Electron	Inf,	a
Fun with Words	Golem	£8	BBC B/ Electron	Inf/Jun,	e
Fun/sums	Kosmos	£4.95	BBC B	Jun,	a
G-Plot	Solent	£18	BBC B	Sec,	u
GB Geography	Primasoft	£6.95	BBC B	Jun/Sec,	g
GB Ltd	Simon Hessel	£5.13	BBC B	Sec,	d
Games of Deduction	Fernleaf	£35.95	BBC B	Jun/Sec,	q
Gas Chromatography	Longman	£14.50	BBC B	Sec,	c,cc
Gas Laws	Longman	£14.50	BBC B	Sec,	c
Gaseous Diffusion	Longman	£14.50	BBC B	Sec,	p
Gases	Garland	£11	BBC B	Sec,	c
Genetic Code	IRL	£19.95	BBC B	Sec,	b
Genetic Code Mutation	Garland	£15	BBC B	Sec,	b
Geography	Corona	£5	BBC B	Sec,	g
Geography	Tutorial	£11.95	BBC B/ Electron	Sec,	g
Geography 'A'	BBC	£11	BBC B	Sec,	g
Geography Revision	Abacus	£12.95	BBC B	Sec,	g
German	Acornsoft	£11.05	BBC B		l
German Master A	Kosmos	£7.35	BBC/ Electron	Sec,	l
German Master B	Kosmos	£8.95	BBC/ Electron	Sec,	
German Sentence	Educated Owl	£9.50	BBC B	Sec,	l
Getset	Griffin	£7.35	BBC B	Jun,	n
Glass	MUSE	£10	BBC B	Sec,	bb
Glycolysis	Garland	£15	BBC B	Sec,	b
Gobledegook	Chalksoft	£9.25	BBC B	Sec,	e
Gold Dust Island	Jacaranda Wiley	£19.95	BBC B	Jun/Sec	s
Gore Point	Garland	£16.50	BBC B	Sec,	ii,s
Grammar Tree	Sulis	£10.95	BBC B	Sec,	e
Granny's Garden	4Mat	£10	BBC B	Jun,	e
Graph	Micro-aid	£7.95	BBC B	Sec,	u
Graph	Oxford Microware	£17.25	BBC B	Sec,	u
Graph-capers	Gem	£8.50	BBC B	Jun/Sec,	u
Graph-plotter	Garland	£11	BBC B	Sec,	u
Graphs	Bryants	£5.10	BBC B	Sec,	u
Graphs 'A'	Salamander	£9.95	BBC B/ Electron	Sec,	u
Graphs 'O'	Ampalsoft	£5.13	BBC B	Sec,	u
Graphs & Charts	Acornsoft	£9.95	BBC A/ Electron	Sec,	u
Gravity	Longman	£14.50	BBC B	Sec,	p
Guided Discovery	Etna Software	£10.75	BBC B	Jun,	i,ee
Hangman	Micro-aid	£7.95	BBC B	Inf/Jun,	e
Hangman Player	Square	£7	BBC B	Jun,	e
Happy Letters	Bourne	£8.95	BBC B/ Electron	Inf,	x
Happy Numbers	Bourne	£8.95	BBC B/ Electron	Inf,	x
Happy Writing	Bourne	£8.95	BBC B/ Electron	Inf,	v
Harlequin	LTS	£14.95	BBC B	Jun/Sec,	gg
Headway	GSN	£200	BBC B	Sec,	kk
Heating Costs	BBC	£10	BBC B	Sec,	d
Henry IV part 1	Penguin	£7.95	BBC/ Electron	Sec,	
Here & There with Mr Men	Mirrorsoft	7.95	BBC/ Electron	Inf,	
Heredity	Longman	£14.50	BBC B	Sec,	b
Hide and Seek	ASK	£8.65	BBC B/ Electron	Jun,	v,w
Highway Code	Bryants	£5.10	BBC B	Jun/Sec,	f
Highway Code	Tectel	£1.95	BBC B	Jun,	f
Highwire	Englefield	£6.25	BBC B	Jun,	m
Hill and Doon	MUSE	£6	BBC B	Sec,	a,n
Hills	Longman	£14.50	BBC B	Sec,	g
Hisdata	Scorby	£9	BBC B	Jun/Sec,	dd,h
History Quiz	Acornsoft	£12.65	BBC B	Sec,	h
History Revision	Abacus	£12.95	BBC B	Sec,	h
Homes	Heinemann	£33	BBC B	Jun,	
Homogenous Equilibrium	Longman	£14.50	BBC B	Sec,	c
Hooked on Numbers	Acornsoft	£9.95	BBC B	Inf,	n
Hot line Quiz	Chalksoft	£11.25	BBC B	Jun/Sec,	q
Hue-men	Clares	£5	BBC B	Inf,	x
Hulk	Brainstorm	£29.90	BBC B	Sec,	cc
Human Blood Groups	Garland	£12	BBC B	Sec,	b
Human Body	Garland	£9.57	BBC B	Sec,	b
Human Energy	Longman	£14.50	BBC B	Sec,	b
Hunt the Thimble	Ginn & Co	£17.50	BBC B	Jun,	
Hydraulics	Database	£5.50	BBC B	Sec,	p
I-spy	Learnwell	£4.99	BBC B/ Electron	Jun,	q
I.T.in Business	McGraw Hill	£180	BBC B	Sec,	i,d
Identify Europe	Kosmos	£7.95	BBC/ Electron	Jun,	
Images	Miga Sci Cal	£9.95	BBC/ Electron	Sec,	
Inheritance	Garland	£20	BBC B	Sec,	b
Inheritance	Simon Hessel	£4.39	BBC B	Sec,	
Inkosi	Chalksoft	£6.95	BBC B	Jun,	d
Inorganic Analysis	Garland	£11	BBC B	Sec,	c
Into the Unknown	Tressell	£9.50	BBC B	Sec,	
Intro	Clares	£7.95	BBC B	Jun,	o
Intro Map Skills	CUP	£18	BBC B	Jun/Sec,	g
Introducing Science	CET	£7	BBC B	Jun,	
Introductory Algebra	Impact	£19.95	BBC B	Sec,	m
Introductory Genetics	Garland	£15	BBC B	Sec	b
Invisible Man	Chalksoft	£6.95	BBC B/ Electron	Jun,	q
Irregular Verbs	Carsondale	£15.99	BBC B	Sec,	l
Italian	Acornsoft	£11.05	BBC B	Sec,	l
Italy	Corona	£5	BBC A	Jun/Sec,	g
Janeplus	Longman	£14.50	BBC B	Sec,	a,n
Jars	Acornsoft	£15.35	BBC B	Sec,	m
Jeu des Menages	CUP	£15	BBC B	Sec,	l
Jigsaw	Golem	£7.95	BBC B/ Electron	Inf/Jun,	
Jigsaw/Word Puzzles	Promotional Artwork	£14.50	BBC B	Inf/Jun,	gg
Journey's End	Fernleaf	£9.95	BBC B	Jun	h
Juggle Puzzle	Acornsoft	£9.95	BBC B/ Electron	Inf/Jun,	q,gg
Jumbles	Bryants	£5.10	BBC B	Jun,	e
Julius Caesar	Penguin	£7.95	BBC/ Electron	Sec,	
Jungle Maths	Scisoft	£7.50	BBC A	Inf/Jun,	m
Junior Hangman Play	Square	£7	BBC B	Jun,	e
Junior Maths	Aztec	£3	BBC B	Jun,	m
Junior Maths	Micro Power	£6.95	BBC B	Jun,	m
Junior Pinball	Impact	£9.95	BBC B	Jun,	a
Junior Word Splits	Sulis	£9.95	BBC B	Jun,	e
Just a Mot	Sulis	£9.95	BBC B	Jun/Sec,	l
Keyrecog	Edsoco	£4.95	BBC A	Special,	x,q
Kidney	Garland	£12	BBC B	Sec,	b
Know Your Own Psi-Q	Mirrorsoft	£9.95	BBC/ Electron	Sec,	
Know Your Own Personality	Mirrorsoft	£9.95	BBC/ Electron	Sec,	
Kon-tiki	Golem	£12.95	BBC B/ Electron	Jun/Sec,	
Kopfjager	Cambridge Micro Software	£15	BBC B	Sec,	l
L	ATM	£10	BBC B	Jun/Sec,	m,q
La Princesse	Aztec	£6.50	BBC B	Jun/Sec,	l
Lake Web	Solent	£9	BBC B	Jun/Sec,	b,s
Language Development	LTS	£9.50	BBC B	Jun/Sec,	e

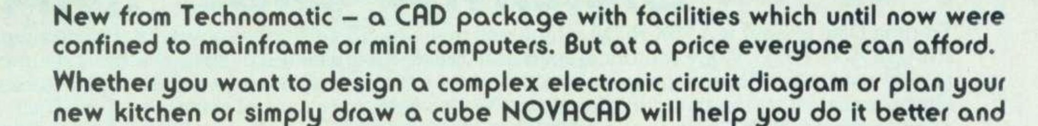
TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Laser Letters	Shards	£6.95	BBC B	Inf/Jun,	e
Lasermaths	Logical	£7.50	BBC B	Jun,	m
Learn About Words	Dorling Kindersley	£9.95	BBC B	Inf/Jun,	v
Learning	AVC	£2	BBC A	Jun/Sec,	i
Learning Maths	Garland	£7	BBC B	Jun,	m
Leaves	Heinemann	£10.93	BBC B	Jun/Sec,	b,x
Lenses	Heinemann	£14	BBC B	Sec,	p
Let's Count	ASK	£8.65	BBC B/ Electron	Inf/Jun,	a
Letterbugs	Highlight	£7.95	BBC B/ Electron	Inf/Jun,	v
Letters	Chalksoft	£11.25	BBC B	Inf,	w
Library-Dewey	Aztec	£6.50	BBC B	Jun/Sec,	y
Lift	Cambridge Micro Software	£15	BBC B	Sec,	
Lingo	Complete	£12.95	BBC B	Jun/Sec,	e
Linreg	Garland	£11	BBC B	Jun/Sec,	u
Lisp	Acornsoft	£16.85	BBC B	Jun/Sec,	i
Littoral Zonation	Garland	£10	BBC B	Sec	ii
Living on a Low Budget	Ed Tech	£24.95	BBC B	Sec,	d
Local Viewdata	ISMeC	£19.95	BBC B	Sec,	dd
Logic	RJE	£7.95	BBC B	Sec,	i
Logic	Shiva	£14.95	BBC A	Inf/Jun,	
Logo	Logotron	£59.95	BBC B	Inf/Jun,	o
Logo Challenge	Addison-Wesley	£14.95	BBC B	Jun,	o
Logo2	Computer Concepts	£10	BBC B	Jun,	o
Longitudinal Waves	Heinemann	£14.38	BBC B	Sec,	p
Look It Up	GED	£4.50	BBC B	Jun,	e
Look Sharp	Mirrorsoft	£7.95	BBC/ Electron	Jun,	
Ltrace	SESS	£8	BBC B	Special,	w
Macbeth	Penguin	£7.95	BBC/ Electron	Sec,	
Machine Code	Interface	£34.95	BBC B	Sec,	i
Magic E	Highlight	£7.95	BBC B/ Electron	Inf,	v
Magic Numbers	Tom Shipman	£7.99	BBC B	Jun,	a
Making Ends Meet	Cambridge Micro Software	£15	BBC B	Sec,	d
Malthus	Longman	£14.50	BBC B	Sec,	d
Map Rally	Bourne	£8.95	BBC B/ Electron	Jun,	g
Map References	Logical	£7.50	BBC B	Jun/Sec,	g
Map Skills	CET	£13.95	BBC B	Sec,	g
Markbook	Carvells	£5	BBC B	Teacher,	
Markbook	Beebsoft	£15	BBC B	Teacher,	
Market Stall	Fernleaf	£9.95	BBC B	Jun	
Mary Rose	Ginn & Co	£32.50	BBC B	Jun/Sec,	h,s
Mass Spectrometer	Longman	£14.50	BBC B	Sec,	p,s
Masterbard	Sulis	£12.95	BBC B	Sec,	e
Mastercab	Bryants	£5.10	BBC B	Jun,	e,q
Masterfile	Beebugsoft	£5.75	BBC B	Admin,	dd
Mastermind	Mirrorsoft	£9.95	BBC/ Electron	Sec,	
Mastermind Quizmaster	Mirrorsoft	£5.95	BBC/ Electron	Sec,	
Matching	Clares	£5.95	BBC B	Inf,	x
Mathematics 1	Acornsoft	£12.65	BBC B	Sec,	m
Maths	Golem	£8.05	BBC A	Inf/Jun,	m
Maths 'O'	Ampalsoft	£11.05	BBC B	Sec,	m
Maths 'O' Level I	Shield	£10.95	BBC/ Electron	Sec,	
Maths 'O' Level II	Shield	£10.95	BBC/ Electron	Sec,	
Maths 1	Tutorial	£11.95	BBC B/ Electron	Sec,	m
Maths Adventure	ATM	£10	BBC B	Jun/Sec,	m
Maths Examine 'O' Level	Shield	£10.95	BBC/ Electron	Sec,	
Maths Revision	Abacus	£12.95	BBC B	Sec,	m
Maths Topics	Cambridge Micro Software	£13.95	BBC B	Sec,	m
Maths Translations	Corona	£5	BBC B	Sec,	m
Maths with Micro	Heinemann	£21.28	BBC B	Jun/Sec,	m
Mathsman	GED	£4	BBC B	Jun,	m
Measurement	Britannica	£75	BBC B	Inf,	m,ee
Measuring Price Elasticity	Longman	£14.50	BBC B	Sec,	d,s
Merger	Longman	£14.50	BBC B	Sec,	d
Metabolic Pathways	Longman	£14.50	BBC B	Sec,	b,s
Metmap-Weather Maps	Garland	£10	BBC B	Sec	g
Micro-English	LCL	£24.50	BBC B	Sec,	e
Micro-Phile	Ephagy	£14.50	BBC B	Sec,	dd

TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Micro-Prolog	LPA	£45	BBC B	Inf/Jun,	o
Microprimer	Tecmedia	£9.80	BBC B	Jun,	
Micro-technology	BBC	£7	BBC B	Sec,	i
Microtext	Acornsoft	£36.85	BBC B	Teacher,	jj
Mine	Longman	£14.50	BBC B	Sec,	j
Missing Signs	Acornsoft	£8.83	BBC B	Jun/Sec,	m
Mmaths	Ed Soft	£4.95	BBC A	Jun,	m
Molecular Behaviour	Ardsoft	£6	BBC B	Sec,	p
Momentum	Longman	£14.50	BBC B	Sec,	p,s
Money Box	Bryants	£4.85	BBC B	Inf/Jun,	n
Money Target	Fernleaf	£9.95	BBC B	Jun	
Monster Maths	Shards	£6.95	BBC B	Inf/Jun,	m
Monster Maze	Kingfisher	£6.90	BBC B	Jun,	a
Morse Code	Aztec	£3	BBC B	Jun/Sec,	l
Motion	Mega Sci Cal	£9.95	BBC/ Electron	Sec,	
Motion Geometry	Garland	£7	BBC B/ Electron	Jun,	m
Motorway Unit	Longman	£14.50	BBC B	Sec,	g
Moving Molecules	CUP	£13.95	BBC B	Sec,	c,s
Mr T Alphabet	Ebury	£12.95	BBC B	Inf,	v
Mr T Measuring	Ebury	£12.95	BBC B	Inf,	a
Mr T Money Box	Ebury	£12.95	BBC B	Inf,	n
Mr T Number Games	Ebury	£12.95	BBC B	Inf,	n
Mr T Tells Time	Ebury	£12.95	BBC B	Inf/Jun	x
Multi-Choice Test	Social Science	£8.50	BBC B	Teacher	q
Muscle Contraction	IRL	£19.95	BBC B	Sec,	b
Music	BBC	£10	BBC B	Sec,	k
Music Tutor	Garland	£9.96	BBC B	Inf	k
Music Editor	SYSTEM	£9	BBC B	Sec,	k
Music Maestro	Promotional ArtWork	£12.50	BBC B	Sec,	k
Music Processor	Quicksilva	£14.95	BBC B	Jun/Sec,	k
Music Quiz	Acornsoft	£12.65	BBC B/ Electron	Sec,	k,q
Music System	Island Logic	£12.95	BBC B	Sec,	k
Musical Numbers	Bryants	£4.85	BBC B	Inf/Jun,	a
Myself	Heinemann	£33	BBC B	Jun,	
Name the Square	Fernleaf	£9.95	BBC B	Jun	
Nectarine Logo	Foulsham	£29.95	BBC B	Inf/Jun,	o
Newton	Arnold	£15	BBC B	Sec,	p
Night Sky	Bridge	£9.90	BBC B	Sec,	z
Nightmare Maths	Logical	£7.50	BBC B	June,	m
Note Invaders	Chalksoft	£9.95	BBC/ Electron	Jun/Sec,	
Nouns	Sulis	£7.35	BBC B	Sec,	e
Nucleic Acid Structure	IRL	£19.95	BBC B	Sec,	b
Number Balance	Acornsoft	£11.90	BBC B	Jun,	n
Number Chaser	ASK	£9.95	BBC B/ Electron	Inf/Jun,	a
Number Gulper	ASK	£9.95	BBC B/ Electron	Inf/Jun,	n
Number Painter	ASK	£9.95	BBC B/ Electron	Inf/Jun,	a,n
Number Puzzler	ASK	£9.95	BBC B/ Electron	Inf/Jun,	a
Number Rally	Longman	£9.95	BBC B	Inf/Jun,	a
Number Skills	Longman	£9.95	BBC B	Inf/Jun,	n
Numberbonds	Bryants	£5.10	BBC B	Inf/Jun,	n
Numberfun	Griffin	£7.35	BBC B/ Electron	Jun,	a
Numbers	MUSE	£9	BBC B	Inf/Jun,	n
Numbo	MUSE	£7	BBC B	Inf/Jun,	n
Numbond	MUSE	£5.50	BBC A	Inf/Jun,	n
Nuts!	Creative Sparks	£7.95	BBC B/ Electron	Jun/Sec,	a
OS Quiz	Arnold Wheaton	£6	BBC B	Sec,	g
Ogles	Games Machine	£8.95	BBC B	Jun/Sec,	x
Open Sesame	Sulis	£9.95	BBC B	Inf/Sec	e
Optics	Hutchinson	£16.	BBC B	Sec,	p
Optics	MUSE	£6.50	BBC B	Sec,	p
Options	SYSTEM	£20	BBC B	Admin,	dd
Options-Timetable	AJ	£14.95	BBC B	Admin,	dd
Organic Analysis	Longman	£14.50	BBC B	Sec,	c
Organic Synthesis	Longman	£14.50	BBC B	Sec,	c
Oscilloscope	Garland	£15	BBC B	Sec,	p
Osprey!	Bourne	£9.95	BBC B/ Electron	Sec,	s
Painting	BBC	£10	BBC A	Jun/Sec,	gg
Paraffin File	BP Ed	£11.95	BBC B	Sec,	
Parity Detection	Darwood	£4.65	BBC A	Sec,	
Pascal	Chalksoft	£6.95	BBC B	Jun/Sec,	m
Passit Geometry	Ed Soft	£5.59	BBC B	Sec,	m
Pathfinder	COIC	£12	BBC B	Sec,	kk
Payslip	Pitman	£39.50	BBC B	Sec,	d
Peeko-Computer	Acornsoft	£9.95	BBC B	Sec,	i

NOVACAD

Computer Aided Draughting for the BBC Micro



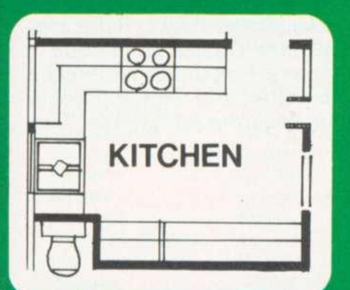


New from Technomatic – a CAD package with facilities which until now were confined to mainframe or mini computers. But at a price everyone can afford.

Whether you want to design a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC Micro Model B fitted with an Acorn DFS system and a disc drive.

If you have a 6502 2nd processor and a dual disc drive system then NOVACAD's capabilities are further enhanced.



MAIN FEATURES

* Very user friendly with all controls and commands from the keyboard.
* Special windowing techniques make available to the user almost one million dots allowing a lot more details to be put on the drawing that one would normally expect the BBC to be capable of. (Mode 0 screen displays only 1/6 the number of dots). The drawing can be 4 screens across and 5 screens up.
* Libraries of user defined shapes such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. Even whole sections of diagrams can be defined as shapes.
* Shapes can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
* A zoom facility allows the user to magnify any section of a drawing by upto 50 times to make it easier to insert details.
* User definable grid helps the user set his own scaling for the drawings.
* Upto 8 'levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly useful in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
* Text can be added at any position vertically or horizontally.
* Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
* Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
* An optional plotter utility will allow output to a range of popular plotters for high quality diagrams.



NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

The NOVACAD package comes with a 16K ROM, Utility disc and a comprehensive manual. All for only £79 + £2 p&p + VAT.



TECHNOMATIC LTD

Tel: 01-208 1177 Telex: 922 800

MAIL ORDERS TO: 17 Burnley Road, London NW10 1ED
SHOPS AT: NW London: 15 Burnley Road, London NW10 1ED
(⊖ Dollis Hill 2 mins walk, ample car parking space)
West End: 305 Edgware Road, London W2. Tel: 01-723 0233 (Near Edgware Road ⊖)
For fast delivery telephone your order quoting VISA or Access card or official order number.



POWERFUL NEW ROMS FOR THE BBC

Never before has there been such a range of powerful but easy to use ROMS for the BBC

ENIGMA DISC IMAGER

Enigma Disc Imager is a 16K ROM which will give you 29 additional powerful disc commands. Some of which are: Enigma will IMAGE ANY DISC, Copy sectors, Repair bad tracks, Read deleted or special sectors, Dumps roms to disc, Loads roms from disc to sideways ram, Moves a programme up or down in memory, Unlocks locked tapes, Locks your tapes, Dumps cassette to disc, Global or selective renaming of directories, Writes deleted or special sectors to disc, Track and sector ID editor facilities, Selective file copier, Formats discs to be 40/80 track compatible (requires an 80 track drive with this command), Special disc editor to cope with protected discs, Special formatter to format discs with non standard tracks, Inserts new files into the catalogue, Enigma makes easy work of editing, copying, repairing, etc., of both standard and non standard discs.

ENIGMA DISC IMAGER IS TUBE COMPATIBLE

ALTRA PROBE

Altra Probe is a 16K ROM which will give you 59 additional powerful machine commands. Some of which are: Altra Probe will list a basic programme straight from file, Formats basic assembler text output, Dissembles, Unpacks, Super Packs, Relocates, Edits memory, Switches off roms, Lists roms, Copies roms to specified address. Calculates free memory, Copies screen text to printer, Lists all specific types of basic variables and values, Graphics dump for Epson or NEC printers, Calculates and details free space on a disc, On board formatter which will automatically format a dual disc, Onboard formatter and verifier. Repairs bad tracks, Disc sector editor, Turns the tube on and off. These are only a few of the commands available from Altra Probe. Altra Probe makes easy work of editing, programme development, etc.
Altra Probe is available in two versions. PROBE 1 and PROBE 2

ALTRA PROBE 2 IS TUBE COMPATIBLE

BASIC ED

Basic Ed, is on 8K ROM which contains 21 additional commands. They are: $ search, List matches, Number matches, Global replace, Selective replace, Bad programme relink, Copy lines from one part of a programme to another, Format a listing, Move, Super pack, Renumber, Table line references, Unpack, Variables X ref, List entire programme, Keyboard immediate mode, Printer on/off, Paged mode on/off, List match lines, Concatenate, Strips rems, spaces etc. Altra Basic Ed. is an essential helpful tool for the Basic / Assembler programmer. Altra Basic Ed. is available in two versions. Basic Ed. 1 and Basic Ed. 2.

ALTRA BASIC ED. 2 IS TUBE COMPATIBLE

FIRST AID 1.1

First Aid 1.1 is an 8K ROM which contains 19 additional commands. They are: Machine code dissembler, Hex and ASCII dump. Sideways rom to ram copier, Function key predefined facilities, Variable table listing, Memory space free calculator, Checksum calculator, Rom lister, String search, Define function keys with strings, Rem and space Stripper, Bad programme fixer, Clear all variables, Clear ram from &0400 to &8000, Machine code monitor, First Aid 1.1 as a language, Lists O.S. calls with their vectors, Lists the first 24 control codes. Altra First Aid 1.1 was designed to assist the Basic / Assembler programmer and the sideways rom user.

PICTURE ANIMATOR

Picture Animator is a mode 7 disc based high quality text and picture editor which lets you compose very sophisticated moving pictures. An ideal tool for the person who wishes to exploit the BBC micros teletex mode. The software is easy to use and your work can be saved to tape or disc.

MUSIC MAESTRO

Music Maestro is a superior and comprehensive disc based sound and music composer. All the sound facilities in the BBC are Utilised. Envelope composition is displayed graphically to assist you in determining the wave form required. Almost any musical instruments voice can be created and reproduced from the BBC. Music Maestro is simple to use and will save your symphony or tune to cassette or disc.







Telephone orders please ring: 0532 451508
Send order to: **ALTRA ROMS, 209 North Street, Leeds LS7 2AA.**

☐ I enclose my order for the above products.
☐ *Please send information sheet on ________ S.A.E. enclosed*

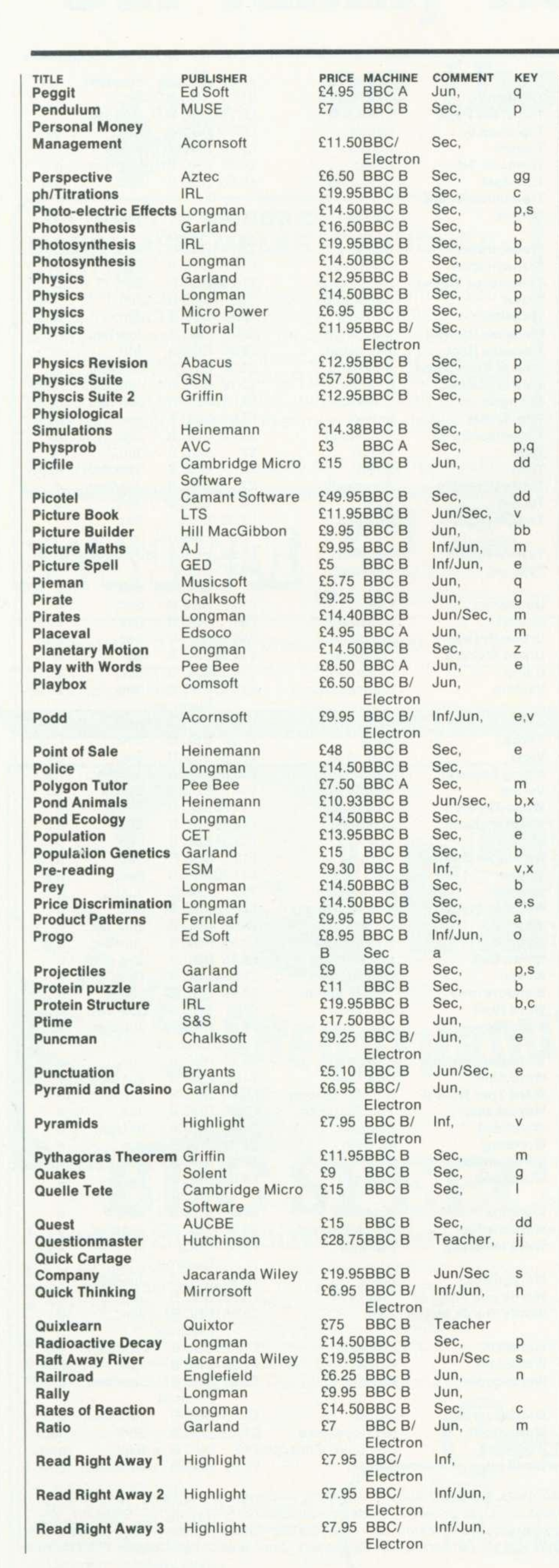
Name ________

Address ________

Please send me:

PICTURE ANIMATOR	*@ £19·00*	____
MUSIC MAESTRO	*@ £19·00*	____
E.D.I.	*@ £49·00*	____
PROBE 1	*@ £49·00*	____
PROBE 2	*@ £59·00*	____
F/AID 1.1	*@ £25·00*	____
BASIC-ED	*@ £29·00*	____
BASIC-ED 2	*@ £35·00*	____
I enclose the sum of	*TOTAL*	*£* ____

Cheque, P.O. or Credit Card Number ________



TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Peggit	Ed Soft	£4.95	BBC A	Jun,	q
Pendulum	MUSE	£7	BBC B	Sec,	p
Personal Money Management	Acornsoft	£11.50	BBC/ Electron	Sec,	
Perspective	Aztec	£6.50	BBC B	Sec,	gg
ph/Titrations	IRL	£19.95	BBC B	Sec,	c
Photo-electric Effects	Longman	£14.50	BBC B	Sec,	p,s
Photosynthesis	Garland	£16.50	BBC B	Sec,	b
Photosynthesis	IRL	£19.95	BBC B	Sec,	b
Photosynthesis	Longman	£14.50	BBC B	Sec,	b
Physics	Garland	£12.95	BBC B	Sec,	p
Physics	Longman	£14.50	BBC B	Sec,	p
Physics	Micro Power	£6.95	BBC B	Sec,	p
Physics	Tutorial	£11.95	BBC B/ Electron	Sec,	p
Physics Revision	Abacus	£12.95	BBC B	Sec,	p
Physics Suite	GSN	£57.50	BBC B	Sec,	p
Physcis Suite 2	Griffin	£12.95	BBC B	Sec,	p
Physiological Simulations	Heinemann	£14.38	BBC B	Sec,	b
Physprob	AVC	£3	BBC A	Sec,	p,q
Picfile	Cambridge Micro Software	£15	BBC B	Jun,	dd
Picotel	Camant Software	£49.95	BBC B	Sec,	dd
Picture Book	LTS	£11.95	BBC B	Jun/Sec,	v
Picture Builder	Hill MacGibbon	£9.95	BBC B	Jun,	bb
Picture Maths	AJ	£9.95	BBC B	Inf/Jun,	m
Picture Spell	GED	£5	BBC B	Inf/Jun,	e
Pieman	Musicsoft	£5.75	BBC B	Jun,	q
Pirate	Chalksoft	£9.25	BBC B	Jun,	g
Pirates	Longman	£14.40	BBC B	Jun/Sec,	m
Placeval	Edsoco	£4.95	BBC A	Jun,	m
Planetary Motion	Longman	£14.50	BBC B	Sec,	z
Play with Words	Pee Bee	£8.50	BBC A	Jun,	e
Playbox	Comsoft	£6.50	BBC B/ Electron	Jun,	
Podd	Acornsoft	£9.95	BBC B/ Electron	Inf/Jun,	e,v
Point of Sale	Heinemann	£48	BBC B	Sec,	e
Police	Longman	£14.50	BBC B	Sec,	
Polygon Tutor	Pee Bee	£7.50	BBC A	Sec,	m
Pond Animals	Heinemann	£10.93	BBC B	Jun/sec,	b,x
Pond Ecology	Longman	£14.50	BBC B	Sec,	b
Population	CET	£13.95	BBC B	Sec,	e
Population Genetics	Garland	£15	BBC B	Sec,	b
Pre-reading	ESM	£9.30	BBC B	Inf,	v,x
Prey	Longman	£14.50	BBC B	Sec,	b
Price Discrimination	Longman	£14.50	BBC B	Sec,	e,s
Product Patterns	Fernleaf	£9.95	BBC B	Sec,	a
Progo	Ed Soft	£8.95 B	BBC B Sec	Inf/Jun, a	o
Projectiles	Garland	£9	BBC B	Sec,	p,s
Protein puzzle	Garland	£11	BBC B	Sec,	b
Protein Structure	IRL	£19.95	BBC B	Sec,	b,c
Ptime	S&S	£17.50	BBC B	Jun,	
Puncman	Chalksoft	£9.25	BBC B/ Electron	Jun,	e
Punctuation	Bryants	£5.10	BBC B	Jun/Sec,	e
Pyramid and Casino	Garland	£6.95	BBC/ Electron	Jun,	
Pyramids	Highlight	£7.95	BBC B/ Electron	Inf,	v
Pythagoras Theorem	Griffin	£11.95	BBC B	Sec,	m
Quakes	Solent	£9	BBC B	Sec,	g
Quelle Tete	Cambridge Micro Software	£15	BBC B	Sec,	l
Quest	AUCBE	£15	BBC B	Sec,	dd
Questionmaster	Hutchinson	£28.75	BBC B	Teacher,	jj
Quick Cartage Company	Jacaranda Wiley	£19.95	BBC B	Jun/Sec	s
Quick Thinking	Mirrorsoft	£6.95	BBC B/ Electron	Inf/Jun,	n
Quixlearn	Quixtor	£75	BBC B	Teacher	
Radioactive Decay	Longman	£14.50	BBC B	Sec,	p
Raft Away River	Jacaranda Wiley	£19.95	BBC B	Jun/Sec	s
Railroad	Englefield	£6.25	BBC B	Jun,	n
Rally	Longman	£9.95	BBC B	Jun,	
Rates of Reaction	Longman	£14.50	BBC B	Sec,	c
Ratio	Garland	£7	BBC B/ Electron	Jun,	m
Read Right Away 1	Highlight	£7.95	BBC/ Electron	Inf,	
Read Right Away 2	Highlight	£7.95	BBC/ Electron	Inf/Jun,	
Read Right Away 3	Highlight	£7.95	BBC/ Electron	Inf/Jun,	

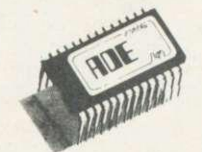
TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Read Right Away 4	Highlight	£7.95	BBC/ Electron	Jun,	
Readability	Arnold-Wheaton	£6	BBC B	Teacher,	v
Reading Music Grade 1	Ardsoft	£31	BBC B	Jun/Sec,	k
Reading Skills	Macmillan	£12.95	BBC B	Inf,	v
Readlevel	Daco	£12	BBC B	Teacher,	v
Readwell	Daco	£18.50	BBC B	Inf/Sec,	v
Relationships	BBC Soft	£17.20	BBC B	Sec,	b,s
Repondez	Heinemann	£14	BBC B	Sec,	l
Research Trail	Fernleaf	£9.95	BBC B	Jun/Sec	
Resistor	RJE	£4.95	BBC B	Sec,	p
Reversals	Chalksoft	£9.25	BBC B	Jun/Sec	w
Rhythm and Pitch	Chalksoft	£14.25	BBC B	Sec,	k
Rice	Longman	£14.50	BBC B	Sec,	g,d
Road Safety	Bryants	£5.10	BBC B	Jun,	f
Road User Insurance	Notts C C	£11	BBC B	Jun/Sec,	d,s
Roadcraft	Highlight	£6	BBC B	Inf/Jun,	f
Robotic Sums	GED	£4.50	BBC B	Inf/Jun,	a
Romeo and Juliet	Penguin	£7.95	BBC/ Electron	Sec,	
Rounders	Britannica	£75	BBC B	Jun/Sec,	
Sam Safety	Argus Press	£9.30	BBC B	Inf,	f
Scalde	MUSE	£6.50	BBC B	Sec,	m
Scales	Heinemann	£14.38	BBC B	Sec,	m
Scavenger Hunt	Jacaranda Wiley	£14.95	BBC B	Jun,Sec,	s
Schooltext	GSN	£14	BBC B	Jun/Sec,	dd
Science	Shards	£6.95	BBC B/ Electron	Sec,	
Sea Cliff Erosion	Cambridge Micro Software	£15	BBC B	Sec,	g
Seed Germination	Garland	£16.50	BBC B	Sec,	b
Sentence Builder	ESM	£9.30	BBC B	Inf/Jun,	e
Sentence Sequence	Acornsoft	£10	BBC B	Jun,	e
Sentence Shaker	GED	£4.50	BBC A	Jun,	e
Sentence Starter	Ed Owl	£9.50	BBC A	Jun,	e
Sentence Construction	SESS	£8	BBC B	Special,	e
Sentence Construction	Darwood	£4.95	BBC A	Jun,	e
Sentences	Ardsoft	£6	BBC B	Jun/Sec	v
Sentences	Sulis	£7.35	BBC B	Sec,	e
Sequence	Solent	£8	BBC B	Inf/Jun,	e
Sequences	Chalksoft	£6.95	BBC B	Jun/Sec,	a
Serpent's Lair	Comsoft	£4.95	BBC B/ Electron	Jun/Sec,	g
Sets	Garland	£7	BBC B/ Electron	Jun,	a
Sets and Operators	Shiva	£14.95	BBC A	Inf/Jun,	a
Shape	Learnwell	£8	BBC B/ Electron	Jun,	
Shape Logic	Solent	£8	BBC B	Inf/Jun,	x
Shape up	ASK	£10.95	BBC B	Jun,	m
Shapes	GED	£8	BBC A	Inf,	
Sheepdog	Longman	£9.95	BBC B	Inf/Jun,	
Sheep Dog Trial	Jacaranda Wiley	£14.95	BBC B	Sec,	s
Shipshapes	Argus Press	£7.95	BBC B	Inf,	x
Shipwrecked	Logical	£7.50	BBC B	Jun,	e
Shoot	Soft Centre	£6.90	BBC B	Jun,	m
Signs	Acornsoft	£11.95	BBC B	Inf/Jun,	
Similies	AVC	£3	BBC A	Jun/Sec,	e
Sixgam	Pitman	£28.75	BBC B	Sec,	e
Skybaby	Stellar	£12.50	BBC B	Sec,	z
Slick!	BP Ed	£11.95	BBC B	Jun/Sec,	s
Solfatu	MUSE	£9	BBC B	Jun/Sec,	k
Sortout	Highlight	£7.95	BBC B/ Electron	Inf/Sec,	v
Space Recognition	GED	£4.50	BBC A	Inf	x
Spanish	Acornsoft	£11.05	BBC B	Sec,	l
Spanish Tutor A	Kosmos	£7.35	BBC B/ Electron	Sec,	l
Spanish Tutor B	Kosmos	£8.95	BBC/ Electron	Sec,	
Special Products	Impact	£14.95	BBC B	Sec,	m
Speechparts	Bryants	£5.10	BBC B	Sec,	e
Speed and Light	Acornsoft	£11.90	BBC B	Jun,	p
Spell	SESS	£8	BBC B	Special,	e
Spellbound	Sulis	£9.95	BBC B	Inf/Jun,	e
Spellcheck	Ed Soft	£4.95	BBC A	Jun/Sec,	e
Spelling	Garland	£8.65	BBC/ Electron	Inf	e
Spelling	Soft Centre	£6.90	BBC A	Jun/Sec,	e
Spelltest	Bryants	£5.10	BBC B	Jun/Sec,	e,q
Splashdown	Highlight	£7.95	BBC B/ Electron	Inf,	v
Sploosh	Highlight	£7.95	BBC B	Inf,	v

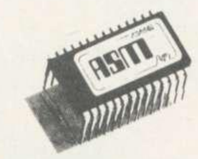
TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Squeeze	ASK	£9.95	BBC B/ Electron	Inf/Jun,	m
Squeeze	Acornsoft	£9.95	BBC B	Jun,	m
Stable	Englefield	£6.25	BBC B	Jun,	e
Starseeker	Mirrorsoft	£9.95	BBC B	Sec,	z
Starspell	MUSE	£8	BBC B	Jun/Sec,	e
Statistics	Longman	£14.50	BBC B	Sec,	u
Statpack	Micro-aid	£9.95	BBC B	Sec,	u
Story	Chalksoft	£7.95	BBC B	Jun,	e
Story	Daco	£14.50	BBC B	Jun,	e
Story	H&H	£7.50	BBC B	Inf,	e
Storybuilder	Bryants	£5.10	BBC B	Jun,	e
Storyline	Daco	£7.95	BBC B	Jun,	e
Structured Programming	McGraw Hill	£5.95	BBC B	Sec,	i
Stspell	MUSE	£9	BBC B	Sec,	e
Studentdata	ESC	£200	BBC B	Admin,	dd
Submarines	GED	£4	BBC A	Jun,	m
Sulphuric Acid	Longman	£14.50	BBC B	Sec,	c
Sum up	Learnwell	£4	BBC B/ Electron	Jun,	m
Super Hangman	IJK	£4.50	BBC B	Jun,	q
Supermarket	COIC	£25	BBC B	Sec,	kk
Superplot	Beebug	£7.50	BBC B	Sec,	u
Superspell	Aztec	£5.50	BBC B	Jun,	e
Survey	Greenwood	£5	BBC B	Jun/Sec,	dd
Survival	SYSTEM	£14.95	BBC B	Sec,	ee
Swindler	Interface	£4.95	BBC B	Inf,	a
Symbols	Britannica	£75	BBC B	Inf,	m,ee
Symbols to Moles	Heinemann	£14	BBC B	Sec,	c
Symmetry	Garland	£7	BBC/ Electron	Jun/Sec,	
Synth	Musicsoft	£8.75	BBC B	Sec,	k
T-Squared	York House	£25	BBC B	Admin,	dd
Tables	AVC	£3	BBC B	Jun,	m
Tables	Bryants	£5.10	BBC B	Jun	m
Tables Adventures	ASK	£8.65	BBC B/ Electron	Inf/Jun,	m
Tables Teacher	Dr Soft	£6.95	BBC B	Jun,	m
Tables Wizard	Hill MacGibbon	£6.95	BBC B	Jun/Sec,	a
Tablesums	Griffin	£7.35	BBC B/ Electron	Jun,	m
Take it Away	Arnold Wheaton	£6	BBC B	Inf/Jun,	a
Target	MUSE	£5.50	BBC B	Jun,	a
Tasmath	Tasman	£5.95	BBC B	Sec,	m
Teacher in the Custard	Pee Bee	£8.50	BBC A	Inf/Jun,	m
Teeth and Dental Care	Garland	£14.50	BBC B	Inf/Jun	
Telebook	4mation	£15	BBC B	Jun,	e,aa
Telem-Nantes	Hodder	£17.25	BBC B	Sec,	l,dd
Temperature Control	Acornsoft	£9.95	BBC B	Sec,	b,s
Tense French	Sulis	£9.95	BBC B	Sec,	l
Terrible Tales	Longman	£9.95	BBC B	Jun,	
Tess	H&H	£8.50	BBC B	Jun/Sec,	m
Tessellations	Cambridge Micro Software	£25.	BBC B	Jun/Sec,	m
Tex-Print	Ephagy	£8	BBC B	Jun/Sec,	gg
Text	MUSE	£8	BBC B	Sec,	e
Textfill	Carsondale	£9.95	BBC B	Sec,	l
The Argonaut	Ajax Computing	£10	BBC B	Jun,	ee
The Cross number puzzle	Darwood	£4.65	BBC A	Inf/Jun,	m
The Establishment	Logical	£7.50	BBC B	Jun,	e
The Garden	Clares	£6.95	BBC B	Inf/Jun,	e
The Jarl	Fernleaf	£9.95	BBC B	Jun/Sec,	h,s
The Merchant of Venice	Penguin	£7.95	BBC/ Electron	Sec,	
The Method	BeeBinEd	£40	BBC B	Sec,	q
The Move	Fernleaf	£9.95	BBC B	Jun,	h,s
The Perfume Hunter	Fernleaf	£9.95	BBC B	Jun,	
The Raiders	Fernleaf	£9.95	BBC B	Jun,	h,s
The Saxons	Garland	£11.50	BBC B	Jun,	
Thermal Equilibrium	Garland	£11	BBC B	Sec,	p
Time Traveller	Sulis	£9.95	BBC B	Jun/Sec,	h,q
Time Man 1	Bourne	£8.95	BBC B/ Electron	Inf/Jun,	x
Time Man 2	Bourne	£8.95	BBC/ Electron	Jun/Inf,	
Times Tables	Aztec	£3	BBC B	Inf/Jun,	m
Titration	Garland	£11	BBC B	Sec,	c

TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
Titrations	SYSTEM	£13	BBC B	Sec,	c
Top of the Pops	Chalksoft	£9.25	BBC B	Jun/Sec,	
Topomap II	Solent	£25	BBC B	Sec,	gg
Towers	Bryants	£5.10	BBC B	Inf,	
Towns of GB	Aztec	£6.50	BBC B	Jun/Sec,	g
Towntest	Silverlind	£6.50	BBC B	Sec,	g,q
Traditional Board Games	Garland	£6.95	BBC/ Electron	Jun,	
Transpiration	Garland	£10	BBC B	Sec,	b
Transpiration	Longman	£14.50	BBC B	Sec,	b
Transverse Waves	Heinemann	£14.38	BBC B	Sec,	p
Travel	Heinemann	£33	BBC B	Jun,	
Treasure	Fernleaf	£9.95	BBC B	Jun,	a
Treasure Islands	Ginn & Co	£25	BBC B	Jun/Sec,	
Treasure Hunt	Kingfisher	£6.90	BBC B	Jun,	m
Tree of Knowledge	Acornsoft	£9.95	BBC B	Jun/Sec,	dd
Tree of Shapes	Bryants	£5.10	BBC B	Jun/Sec,	m,dd
Triangles	Chalksoft	£11.25	BBC B	Jun/Sec,	m
Trig Basics	Impact	£14.95	BBC B	Sec,	m
Trigonometry 'O'	Ampalsoft	£5.13	BBC B	Sec,	m
Tstar	MUSE	£7	BBC B	Jun,	m
Ttest	SESS	£8	BBC B	Special,	n,q
Turtle Graphics	Acornsoft	£16.85	BBC B	Jun/Sec,	o
Turtles	AVC	£6	BBC B	Jun,	o
Twelfth Night	Penguin	£7.95	BBC/ Electron	Sec,	
Type Invaders	Carswell	£6.95	BBC	Jun/Sec,	t
Typeasy	Carswell	£8.95	BBC/ Electron	Sec,	t
Umziehen	CUP	£15	BBC B	Sec,	l
Unistat	University	£85	BBC B	Sec,	u
Urban Growth	Longman	£14.50	BBC B	Sec,	e,s
Urban Welfare	Longman	£14.50	BBC B	Sec,	e
Utility	Longman	£14.50	BBC B	Sec,	e
Vectors	Salamander	£14.95	BBC B/ Electron	Sec,	m
Vectors	CUP	£15	BBC B	Sec,	m
Verbs	Sulis	£7.35	BBC B	Sec,	l
View	Acornsoft	£59.80	BBC B	Sec,	aa
Viking England	Fernleaf	£45.95	BBC B	Jun/Sec,	h,s
Vu-file	Psion	£14.95	BBC B	Sec,	dd
Wage Theory	Longman	£14.50	BBC B	Sec,	e
Water on Land	Longman	£14.50	BBC B	Sec,	g,s
Watts	CUP	£13.95	BBC B	Sec,	p
Waveform Analysis	Garland	£11	BBC B	Sec,	p
Waves	BBC Soft	£17.20	BBC B	Sec,	p,s
Weather	Heinemann	£33	BBC B	Jun,	g
Weather Station	Arnold Wheaton	£17.50	BBC B	Sec,	g
Whatsit	Ed Soft	£4.95	BBC B	Jun/Sec,	q
Where?	Micro Power	£6.95	BBC B	Jun/Sec,	g,q
Which Salt	Micro Power	£6.95	BBC B	Sec,	c
Winds	Longman	£14.50	BBC B	Sec,	g
Wonderwords	Tom Shipman	£7.99	BBC B	Jun,	e
Word Hunt	Acornsoft	£10	BBC B	Jun/Sec,	e
Word Mover	BBC Soft	£9.95	BBC B/ Electron	Jun/Sec,	aa
Word Sequencing	Acornsoft	£9.95	BBC B	Jun,	e
Word Skill	Chalksoft	£12.25	BBC B	Jun/Sec,	e
Word Tray Wizard	Hill MacGibbon	£6.95	BBC B	Jun/Sec,	e
Wordchaser	Tom Shipman	£7.99	BBC B	Jun,	e
Wordflash	Edsoco	£4.95	BBC A	Inf/Jun,	e
Wordfrog	Ed Owl	£7.50	BBC B	Jun,	e
Wordgames	Griffin	£7.35	BBC B	Jun,	e
Wordhang	Bourne	£8.95	BBC B/ Electron	Inf/Jun,	e
Wordline	Aztec	£3	BBC B	Jun,	e
Wordmaster	RH Electronics	£9.95	BBC B	Jun/Sec,	e
Word Matching	Garland	£8.65	BBC/ Electron	Inf,	v
Wordpower	Sulis	£9.95	BBC B	Jun/Sec,	e
Words and Pictures	Chalksoft	£9.95	BBC B	Jun,	e
Words Words Words	ASK	£8.65	BBC B/ Electron	Jun,	e
Wordskill	Chalksoft	£12.25	BBC B	Jun/Sec,	v,q
Wordspell	Griffin	£7.35	BBC B	Jun,	e
Wordsquare	Garland	£5.95	BBC B/ Electron	Jun/Sec,	e
Wordsquares	MUSE	£6	BBC B	Jun/Sec.	e
Wordsworth	Ian Copestake	£10	BBC B	Sec,	aa
Wordwise	Computer Concepts	£40	BBC B	Sec,	aa
World-wise	Bourne	£8.95	BBC B	Jun/Sec,	g

a—*Arithmetic*, b—*Biology*, c—*Chemistry*, d—*Economics*, e—*English*, f—*Road skills*, g—*Geography*, h—*History*, i—*Computer studies*, j—*Engineering*, k—*Music*, l—*Languages*, m—*Maths*, n—*Number bonding*, o—*Logo*, p—*Physics*, q—*Quiz or test*, r—*Rote*, s—*Simulation*, t—*Typing*, u—Statistics, v—*Reading*, w—*Writing*, x—*Recognition*, y—*Library*, z—*Astronomy*, aa—*Word processing*, bb—*Design*, cc—*Analysis*, dd—*Database*, ee—*Topic based*, ff—*Food and nutrition*, gg—*Graphics*, hh—*Self assessment*, ii—*Ecology*, jj—*Authoring*, kk—*Careers*, Sec—*Secondary*, Jun—*Junior*, Inf—*Infants*.

Our family now run faster on the Tube®





The industry standard MACRO ASSEMBLER - DEBUGGER - EDITOR.

Used entirely by Island Logic and System to write 90K of m/c for The Music System! Version 2 has been significantly enhanced to include local labels, any number of output files, enhanced arithmetic expressions. With a SECOND PROCESSOR there is an **80 column** version of the powerful ADE macro EDITOR and the option to assemble to memory for a really **fast** assembly.

£60 inc vat Please specify 40T or 80T utility disc

The ASSEMBLER that professional software writers use.

All the superb features of the ADE macro assembler version 2.

£35 inc vat Please specify 40T or 80T utility disc



The most comprehensive and cost effective of all DEBUGGING / DISC UTILITY ROMs.

The SECOND PROCESSOR compatible version can now SPY into either side of the Tube® or into any ROM.

Rated by many reviewers as the best disc utility EPROM on the market.

£30 inc vat

SYSTEM



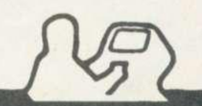


(0742) 682321

Please ring for upgrade prices

Dept. G 12 Collegiate Crescent Sheffield S10 2BA

Exclusive Scandinavian distributors
Dataforum
Oslo 5 02-371440



Tube® is a registered trade mark of Acorn Computers Ltd.

£24.95

PRICE BREAKTHROUGH

BBC SPEECH

Speech Synthesizer for the BBC Computer

- Totally unlimited vocabulary is now possible with the revolutionary "SWEET TALKER" Speech Synthesizer for the B.B.C. A or B Microcomputer, any series.
- The CHEETAH "SWEET TALKER" simply plugs into speech socket IC99 within the computer. No soldering, no cutting of tracks, no headaches.
- Based on an allophone system you can easily program any word, sentence or phrase and incorporate speech into your software games.
- Fully tested and guaranteed. Complete with demonstration cassette and full instructions.

CHEETAH ©1984

Prices include VAT, postage & packing.
Delivery normally 14 days.
Export orders at no extra cost.
Dealer enquiries welcome.
Cheetah, products available from branches of
John Menzies, Boots, WHSMITH, Rumbelows
WOOLWORTH **Spectrum** dealers
and all good computer stores.

Cheetah Marketing

Dept AU5

Cheetah Marketing Ltd, 24 Ray Street,
London EC1R 3DJ. Tel: 01 833 4909.
Telex: 8954958.

Clwyd Technics

TREKKER

MK VI

ROBOT VEHICLE

Trekker is a multi-function classroom robot vehicle which does much more than merely moving and drawing. Designed for education but also ideal for the home enthusiast. ***Trekker*** is supplied with over 30 pieces of software.

Its applications include:
- white line follower • bar graphs
- pen software • angles • polygons
- area measurement • length measurement
- co-ordinates • music • sound

- all of which are graphic, colourful and interesting.

The complete ***Trekker*** package includes software guide, user guide, function key overlays and everything you need to teach control technology. The pupil worksheets, OHP transparencies and project work suggestions make ***Trekker*** easy to teach and great fun to learn.

Trekker requires no technical knowledge. An absolute beginner, following the instant start guide, can use his ***Trekker*** robot vehicle within 2½ minutes straight from the pack.

No assembly necessary. ***Trekker*** plugs directly into your BBC microcomputer user port with a single cable (supplied) and does not require any other cables, power units or connections.

THE COMPLETE PACKAGE ONLY £125 INCL. VAT AVAILABLE IN MAY

CLWYD TECHNICS LIMITED,
DEPT T/AU02, ANTELOPE INDUSTRIAL ESTATE,
RHYDYMWYN, NR. MOLD, CLWYD, CH7 5JH.
Tel: Hendre (035283) 751.

SPECIAL OFFER

EDWORD WORD PROCESSOR HOME PACK

The pack contains:–
- ★ 1 EDWORD word processor 16K ROM chip
- ★ 1 user Reference Guide
- ★ 1 Keyboard Insert
- ★ 1 disc/cassette for printer configuration



You have heard of EDWORD, the educational word processor for the BBC microcomputer, now you can use it in your home at a price you really can afford. Send letters, compile reports, write books, poems, short stories . . . Take advantage of EDWORD's exceedingly user-friendly editing facilities to give your work the professional look, and never retype or use liquid paper again. Even the children can user EDWORD. BUT HURRY – this very special offer is available only while current stocks last. Send off the order form below or quote reference number EWPAU02.

Please send me:–
— EDWORD Home Pack(s) – disc 40T/80T (please delete as appropriate)
— EDWORD Home Pack(s) – cassette

At the total special offer price of **ONLY £39.95** including delivery and including V.A.T.

Name (Mr/Mrs/Miss/Ms) ....
Address ....
.... Tel: ....
Date .... Cheque number: ....

PLEASE SEND THIS ORDER TO:–



CLWYD TECHNICS LIMITED
Dept EWPAU02, Antelope Industrial Estate, Rhydymwyn, Mold, Clwyd. Tel: Hendre (035283) 751

EDUCATIONAL SOFTWARE PUBLISHERS

Abacus 21 Union Street, Ramsbottom, New Bury, Lancs
Acornsoft Betjeman House, 104 Hills Road, Cambridge CB2 1LQ, tel: (0223) 316039
Addison-Wesley Ltd Finchampstead Road, Wokingham, Berks RG11 2NZ, tel: (0734) 794000
AJ Software 61 Jeddo Road, London W12 9ED
Ajax 57 Rowley St, Walsall, West Midlands WS1 2AZ
Akadimias University College of North Wales, Bangor, Gwynedd LL57 2DG
Alpha Computer School Ebernoe House, 33 Chesswood Road, Worthing, Sussex BN11 2AA, tel: (0903) 210701
Ampalsoft 31 Woodbridge Road, Darby Green, Blackwater, Camberley, Surrey, tel: (0252) 876677
AUCBE Chiltern Computing, Endymion Road, Hatfield, Herts, tel: (07072) 65443
AVC PO Box 415 Birmingham
Ardsoft Educational Software 20 Castle View, Leeds LS17 5BY, tel: (0532) 693859
Argus Press 1 Golden Square, London W1R 3AB, tel: 01-437 0626
Arnold 41 Bedford Square, London WC1B 3DQ
Arnold-Wheaton Ltd Parkside Lane, Dewsbury, Leeds LS5 TD
ASK London House, 68 Upper Richmond Road, London SW15 2RP, tel: 01-874 6046
ATM Kings Chambers, Queen Street, Derby DE1 3DA
BAKsoft 34 Humberstone Road, Cambridge
BBC—Beebsoft Room 107, 35 Marylebone High Street, London W1M 8AA, tel: 01-580 5577
BeeBinEd The Coach House, Hunsdonbury, Ware, Herts SG12 8PW, tel: (0920) 870508
Beebug PO Box 109, High Wycombe, Bucks, tel: (0727) 60263
Beltech College House, St Leonard's Close, Bridgnorth, Salop
Bourne Educational Software Bourne House, The Hundred, Romsey, Hants SO5 8BY, tel: (0794) 523301
Brainstorm 103a Seven Sisters Road, London N7 7QN, tel: 01-263 6926
Bridge Software 36 Fernwood, Marple Bridge, Stockport, Cheshire SK6 5BE
Bryants 1 The Hollies, Chalcraft Lane, North Bersted, Bognor Regis PO21 5SX
Busco 16 Colwill Walk, Mainstone, Plymouth, Devon
Camant Software Services 8 Graigstewart Crescent, Alloway, Ayr KA7 4DB, tel: (0292) 43492
Cambridge Micro Software—see CUP
Carswell Computers Farringdon, Oxon SN7 8JN, tel: (036 787) 238
Carvells 3-7 Bank Street, Rugby, Warwicks
CCS 14 Langton Way, London SE3 7TL
CET-Council for Educational Technology 3 Devonshire Street, London W1, tel: 01-580 7553
Chalksoft Ltd PO Box 49, Spalding, Lincs PE11 1NZ
Clares Micro Supplies Providence House, 222 Townfields Road, Winsford, Cheshire
Clwyd Technics Unit 4B, Antelope Industrial Estate, Rhydymwyn, Mold, Clwyd, tel: (0352) 83751
COIC Software Manpower Services Commission, Moorfoot, Sheffield S1 4PQ, tel: (0742) 704563
Complete 32-38 Osnaburgh Street, London NW1 3ND, tel: 01-387 9503
Computer Concepts 16 Wayside, Chipperfield, Herts WD4 9JJ, tel: (09277) 69727
Computercat 224 Chapel Street, Leigh, Lancs
Comsoft 7 Roman Drive, Leeds LS8 2DR
Ian Copestake 23 Connaught Crescent, Brookwood, Woking, Surrey, tel: (0486) 74755
Corona 73 High Road, South Woodford, London
Creative Sparks Thomson House, 296 Farnborough Road, Farnborough, Hants GU14 7NU, tel: (0252) 543333
CUP—Cambridge University Press Edinburgh Building, Shaftesbury Road, Cambridge, tel: (0223) 312393
DACC 23 Waverley Road, Hindley, Lancs
Daco 59 Mackenzie Road, Moseley, Birmingham, tel: 021-449 2253
Database 27 City Road, Stoke, Staffs
Datapen Kingsclere Road, Overton, Hants
Dial Software 72 Downend Road, Downend, Bristol, Avon
Doctor Soft 258 Coneygree Road, Peterborough, Cambs, tel: (0903) 206076
Dorling Kindersley 1-2 Henrietta Street, London WC2E 8PS, tel: 01-240 5151
Ebury Software National Magazine Co, 72, Broadwick Street, London W1
Ed Tech Services The Barn, Thorney, Peterborough PE6 0GA, tel: (0733) 270805
Ed Soft 76 Woodville Road, Exmouth, Devon, tel: 0395 275741
Educated Owl 62 Airedale Avenue, Tickhill, Doncaster, S Yorks.
Englefield High House, Mill Street, Buxton, Norwich, Norfolk
Ephagy Software 125 Corporation Road, Grimsby, South Humbs DN31 1UR, tel: (0482) 812902
ESC 50 Pope Road, Bromley, Kent, tel: (01) 464 7890
ESM Educational Software for Microcomputers Duke Street, Wisbech, Cambs, tel: (0945) 63441
Etna Software 58 Weelsby Road, Grimsby S Humbs, tel: (0472) 77215
4mation Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ, tel: (0271) 45566
Fernleaf Educational Software Fernleaf House, 31 Old Road West, Gravesend, Kent DA11 0LH, tel: (0474) 59037
Flite Conway, County Donegal, Eire
Focusplan Focus House, 57 Westgate, Cleckheaton, W Yorks
Foulsham Educational Yeovil Road, Slough, Berks SL1 4JH
Franklin Watts 12a Golden Square, London W1R 4BA, tel: 01-437 0713
Garland Computing 35 Dean Hill, Plymouth, Devon PL9 9AF, tel: (0752) 41287
GEM Software 1 Oswald Road, Leamington Spa, Warwicks
GED 70 Stoke Road, Bletchley, Milton Keynes, Bucks
Gibsoft 38-42 Peveril Street, Nottingham, Notts
Ginn & Co Prebendal House, Parsons Fee, Aylesbury, Bucks
Golem 77 Qualitas, Bracknell, Berks RG12 4QG, tel: (0344) 50720
Greenwood, J G Seal, Greenwood Cottage, Lower Bockhampton, Dorchester, Dorset DT2 8PZ
Griffin & George 285 Ealing Road, Alperton, Wembley, Middx HA0 1HJ, tel: 01-497 3344
GSN Educational Software 214 Stamford Street, Asthon-under-Lyme, Lincs OL6 7LR, tel: (061) 339 6635
GT Software 8 Bull Street, Potton, Sandy, Beds
H & H Software 53 Holloway, Runcorn, Cheshire
J Hargreaves Updown, Pewley Way, Guildford, Surrey
Heinemann Computers in Education 22 Bedford Square, London WC1 3HH, tel: 01-637 3311
Simon Hessell Software 15 Lytham Court, Cardwell Crescent Sunninghill, Berks
Hexagon Software 17 Straits Road, Gornal, Dudley, W Midlands
Highlight Software 36 Sherbourne Close, Barry, S Glamorgan CF6 5AQ, tel: (0446) 745482
Hill MacGibbon St Bartholomew House, 92 Fleet Street, London EC4
Hodder & Stoughton Mill Road, Dunton Green, Sevenoaks, Kent
Hopesoft Hope Cottage, Winterbourne, Newbury, Berks
Hutchinson Education Hutchinson House, 17-21 Conway Street, London, tel: 01-387 2811
IJK Software 9 King Street, Blackpool, Lancs
Interface 9-11 Kensington High Street, London W8
IRL Press PO Box 1, Eynsham, Oxford OX8 1JJ
Island Logic System, 12 Collegiate Crescent, Sheffield S10 2BA
ISMeC Westminster College, North Hinksey, Oxford OX2 9AT
IT Consultancy Notting Dale ITEC, 189 Freston Road, London W11
Jacaranda Wiley Software Baffins Lane, Chichester, Sussex PO19 1UD
Kansas City Systems Unit 3, Sutton Springs Wood, Chesterfield, Derbys
Kingfisher Computer Services Durley Lane, Keynsham, Bristol, Avon
Kosmos Software 1 Pilgrims Close, Harlington, Dunstable, Beds
LCL 26 Avondale Avenue, Staines, Middx, tel: (0784) 58771
Learnwell 152 Westmorland Road, Wyken, Coventry, Warwicks
Logical Software LVL, Scientific House, Bridge Street, Sandiacre, Notts, tel: (0602) 394000
Logo Software 316a Richmond Road, Twickenham, Middx TW1 2PD, tel: 01-891 0989
Logotron Ryman House, 59 Markham Street, London SW3 4ND
Longman Group Longman House, Burnt Mill, Harlow, Essex CM20 2JE, tel: (0279) 26721
LPA 10 Burntwood Close, London SW18 3JU, tel: 01-874 0350
LTS Learning and Training Systems Ltd, Haydon House, Alcester Road, Studley, Warwicks, tel: (0386) 792617
MacDonald Educational Maxwell House, 74 Worship Street, London EC2 2EN, tel: 01-377 4673
McGraw-Hill Book Co Shoppenhangers Road, Maidenhead, Berks, tel: (0628) 23432
Mega Sci Cal Software PO Box 6, Birkenhead, Merseyside L43 6XH, tel: 051-652 3139
Micro-aid 25 Fore Street, Praze, Camborne, Cornwall
Micro Power 8-8a Regent Street, Chapel Allerton, Leeds, W Yorks
Microwave 24 Belford Road, Stretford, Manchester
Mirrosoft Mirror Group Newspapers, Holborn Circus, London EC1P 0DQ, tel: 01-353 0246
MJP Earth Science Software, Freepost, PO Box 23, Faversham, Kent, tel: (0795) 534690
MUSE PO Box 43, Hull HU1 2HD
Musicsoft 12 Fallowfield, Ampthill, Beds, tel: (0525) 402701
NEC – National Extension College 18 Brooklands Avenue, Cambridge, Cambs
Nelcal Nelson Nelson House, Mayfield Road, Walton-on-Thames, Surrey KT12 4BR
Notts Ed Suppliers 17 Ludlow Hill Road, Melton Road, West Bridgford, Nottingham NG2 6HD
Notts CC Trent Bridge House, Fox Road, Nottingham NG2 6BJ, tel: (0602) 824824
Opalsoft 112 Arterial Road, Eastwood, Leigh-on-Sea, Essex
Orion Software 11 Buttercup Close, Romeighs Park, Harold Wood, Essex RM3 0XF
Optima 68 Chester Row, Hazelgrove, Stockport, Cheshire SK7 5NY
Oxford Microware 52 St Giles, Oxford OX1 3LU, tel: (0865) 54505
Pee Bee 8 Beechwood Road, Chippenham, Wilts
Penguin Study Software 536 King's Road, London SW10, tel: 01-351 2393
Pitmansoft 128 Long Acre, London WC2, tel: 01-379 7383
Primasoft 2 Spinney Close, Glossop, Derbys
Promotional ArtWork Systems 9 Mayo Close, Leeds LS8 2PX
Psion Ltd 2 Huntsworth Mews, Gloucester Place, London NW1 6TD
Quicksilva 13 Palmerston Road, Southampton SO1 1LL, tel: (0703) 220169
Quixtor 7 Haslemere Avenue, Hale Barns WA15 0AU
RH Electronics Chesterton Mill, French's Road, Cambridge CB4 3NP
RJE Software 143 Montague Road, London E11 3EW
RMK Electronics Hinton House, Station Road, New Milton, Hampshire
RoSPA-Royal Society for the Prevention of Accidents The Priory, Queensway, Birmingham B4 6BS
Salamander Software 27 Ditchling Rise, Brighton, Sussex BN1 3AA, tel: (0273) 771942
S & S Schofield and Sims, Dogley Mill, Fenay Bridge, Huddersfield
Schoolsoft 19 Shadwell Grove, Radcliffe-on-Trent, Nottingham, Notts
Shards Software Ltd 189 Eton Road, Ilford, Essex
Shield 55a Leatherhead Road, Chessington, Surrey KT9 2HN, tel: 01-397 4524
Shiva Publishing Ltd 64 Welsh Row, Nantwich, Cheshire CW5 5ES, tel: (0270) 629440
Shumwari Associates 12 Marlin Court, Marlow, Bucks SL7 2AJ
Silverlind 156 Newton Road, Burton-on-Trent, Staffs, tel: (0283) 63987
Simonsoft 25 Tatham Road, Abingdon, Oxon OX14 1QB
SESS Specialised Education and Software Services Central Trading Estate, 275-277 Bath Road, Bristol, tel: (0272) 710103
Social Science Software Freepost, Birkenhead, Merseyside L42 2AB
Soft Warehouse 285 Oldbury Road, Worcester, Worcs, tel: (0623) 25307
Square Software 12a Uplands Terrace, Swansea, W Glamorgan
Stellar 84 Dudsbury Road, Ferndown, Wimborne, Dorset, tel: (0202) 575234
Storm Newbury Court, High Street, Gillingham, Dorset
Superior Software 69 Leeds Road, Bramhope, Leeds, W Yorks
Synergy 7 St Andrews Close, Slip End, Luton, Beds
SYSTEM 12 Collegiate Crescent, Sheffield S10 2BA, tel: (0742) 682321
Tasman Software 17 Hartley Crescent, Leeds, W Yorks, tel: (0532) 438301
Tecmedia 5 Granby Street, Loughborough LE11 3DU, tel: (0509) 230248
Tectel Telford ITEC, Halesfield 14, Telford, Salop, tel: (0952) 581738
Tom Shipman PO Box 406, Brentwood CM13 3QE
Tressell 139 Carder Avenue, Brighton, Sussex, tel: (0273) 561464
Tutorial Software Freepost, Wirral, Merseyside L61 1AB
Unilever PO Box 68, Unilever House, London EC4P 4BQ
University Software 29 St Peter's Street, London N1 8JP, tel: 01-359 0978
Weaversoft 22 Lodge Drive, Moulton, Northwich, Cheshire CW9 8RQ
Wida Software 2 Nicholas Gardens, London W5 5HY, tel: 01-567 6941
York House 33 West Street, Oundle, Peterborough, Cambridgeshire PE8 4EJ

A NEW BREED OF KEYBOARDS

Has the qwerty keyboard had its day? Chris Drage outlines some of the alternatives on the scene

THE FACT that just about every micro sold has a qwerty or typewriter keyboard is really something of a historical accident. In the days of mechanical typewriters this rather illogical arrangement of keys was necessary to separate the most frequently used keys which, if placed together, tended to jam the mechanism, and this layout has persisted.

With computers finding a niche in both primary schools and the home the question arises: should we present young children with so many bizarre symbols and expect them to cope?

However, there is an increasing number of alternative keyboards available for the BBC micro, and so it's worth having a look at what three of them offer.

The Concept Keyboard from Star Microterminals, the Presfax 100 Keypad from Schofield and Sims and the Touchmaster from Touchmaster have one thing in common – they present the user with an array of touch-sensitive pads which may be programmed according to his or her needs. This feature opens the way to a vast range of applications. Each keypad uses overlays which are individual to a program. Thus, only the inputs essential to each piece of software are presented, in a form appropriate to the experience or ability of the user. In addition, overlays are not restricted to a two-dimensional format – elaborate 3D ones can be constructed involving, for example, a model farm, a park or a supermarket, and actual models can then be moved over the board. The variety of arrangements is endless. Once the unnecessary features of the normal keyboard are removed, life certainly becomes easier for the child.

Concept Keyboard

The Concept Keyboard has been available in its familiar A4 size for over a year now and, at the time of writing, A3/128 and A3/256 boards are available. A2/128 and A2/256 boards are to be launched soon. Each is constructed from a wipe-clean, scratch- and chemical-resistant polycarbonate surface, mounted in an aluminium case. The keyboard is linked to the Beeb via a 1100mm ribbon cable to the user port. In addition to the 128 or 256 pads there are a number of larger, specialised pads at the top of the board. These comprise a user pad, a repeat pad, a 'bleep' on/off pad and a shift pad (the latter on 128 boards only). Of these, the shift pad is probably the most significant as it allows the 128 cell models to produce 256 different signals. The bleep key provides a soft note to confirm the press of a keypad.

The 128 board has its 128 touch sensitive areas arranged in a 16 × 8 matrix while the 256 board uses a 16 × 16 array. Any key or group of keys can be assigned by the user to any character, word, numeral, shape, etc. The documentation describes routines and procedures to build into your programs to enable the Concept Keyboard to communicate with the computer. Anyone with some programming experience would find this a straightforward exercise. Remember, the program must have space and be listable.

PRODUCTS AND PRICES

	Concept Keyboard	Presfax 100 Keypad	Touchmaster
Dimensions	A4 Board 227 × 315 × 25.4mm (overlay 210 × 297mm) A3 Board 315 × 435 × 25.4mm (overlay 297 × 420mm)	360 × 360 × 3mm	350 × 330 × 30mm (Overlay 210 × 297mm)
Cable length	1100mm (user port)	1000mm (analogue port)	1500mm (RS423 port)
Peripherals		Perspex 100 square overlay + pegs (£9.50 + VAT)	
Price	A4/128: £90 + VAT A3/128: £114 + VAT A3/256: £156 + VAT	£79.50 + VAT	£149.99 inc VAT plus £4.99 inc VAT for BBC micro interface
Software supplied	Starset (disc)	Introductory user pack £5.50 + VAT (cassette) £8.50 + VAT (disc)	Multipaint (cassette)
Review copy obtained from	Star Microterminals, 22 Hyde Street, Winchester, Hants SO23 7DR	Schofield & Sims, Dogley Mill, Fenay Bridge, Huddersfield HD8 0NQ	Touchmaster, PO Box 3, Port Talbot, West Glamorgan SA13 1WH

I received a draft of the new manual, and its author has made this extremely detailed document readable and understandable to the inexperienced user.

I suspect many teachers will want to adapt existing programs for use with this keyboard. Star Microterminals are well aware that few teachers have the time or inclination to write their own software adaptations, so they have thoughtfully provided an excellent software package called *Starset* to take the hard work out of this.

All that you have to do is draw up the actual overlay (see picture). I found a piece of stout tracing paper is the only aid necessary.

The Concept Keyboard is a well designed and manufactured unit. Features like the keyboard's strength of construction, its reliability and its sensitive response over the entire matrix area all add up to what can only be described as an excellent product and a most valuable addition to a school's computer resources. With an increasing number of software houses now providing Concept Keyboard software, I unhesitatingly recommend this unit for primary and special schools.

The Presfax 100 Keypad has 100 touch-sensitive squares arranged in a 10 × 10 matrix. It measures 360 × 360 × 3mm and, although this sounds rather on the thin and flimsy side, its 5-ply fibre base proved to be both strong and flexible.

Included in the package are the keypad, a handbook and a connecting lead. An introductory software pack (including four overlay sheets with locating pegs) is available on cassette at £5.50 or disc at £8.50. Included in the review sample was a clear perspex peg board with locating pegs and wooden counting pegs; this is available at an additional cost of £9.50.



Home-made overlays make the Concept Keyboard a versatile tool



The *Junior Counting Board* package in action on the Presfax 100

Presfax 100

The Presfax 100 is connected via a 1000mm, 6-way ribbon cable to the analogue port on the BBC micro. Assembling and connecting up the system proved to be a very quick and easy process. Before the Presfax 100 can be used, however, it must be calibrated because each keypad generates slightly different signals. A program called *Calibrate* takes the grind out of this operation and in turn produces a file which may then be transferred to any disc containing Presfax software, the idea being to boot this program up from disc at the start of each session. For cassette users this is a rather tiresome task as it all takes valuable time. Once the driver file is in place you are ready to start.

A substantial software package is available at an additional cost. It comprises *Actfax, Facefax, Sketchfax, Askfax* (on disc version only), *Getfax* (on disc version only), *Preskel* and *Junior Counting Board.*

For me the star of this package is the *Junior Counting Board.* This suite of seven programs enables children to explore number relationships through the medium of a 100-square peg board. The programs vary in difficulty from simple counting games to activities involving multiples and the discovery of prime numbers. As my class of 10-year-olds had just embarked on a study of factors, products and multiples I thought this would be an excellent opportunity to introduce the less able of them to the *Junior Counting Board.* Using the perspex overlay and the coloured wooden pegs, it took even the weakest child no time at all to arrive at the prime numbers using the Sieve Of Eratosthenes method. Much discussion took place concerning the patterns created by the multiples of various numbers, and the activity provided an excellent springboard for further work. I do, however, have a criticism of the level of the language in the programs, much of which is unnecessary anyway. I would have preferred to see an on-screen 100-square confirming the squares in use and a provision for teaching routines to help the child.

The 20-page handbook is well written and describes both setting up the Presfax 100 and the software in some detail. There is a useful section describing how to adapt the user's own programs with the help of the *Preskel* program.

Undoubtedly, the Presfax 100 will find a place in primary schools, and I'm certain Schofield and Sims will ensure

HOW THEY SCORE

Touch Pad:	Concept Keyboard	Presfax 100	Touchmaster
Design	4	3	3
Construction	5	4	3
Strong enough for use in	schools, industry, laboratory	schools, home	home
Cable length	4	4	5
Handling characteristics	5	3	3
Ease of use	5	4	2
Software provided	4	4	3
Documentation	5	4	3
Range of applications	wide	education	entertainment
Value for money	4	4	2

KEY 5 *excellent*, 4 *good*, 3 *satisfactory*, 2 *poor*, 1 *very bad.*

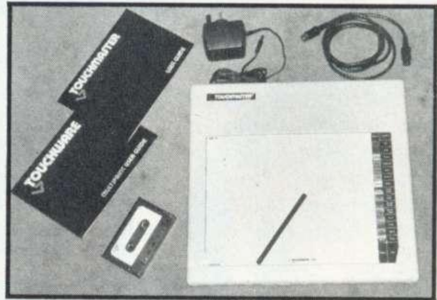
that software support is not thin on the ground. The first generation software provided with the keypad has promise of better things to come.

Touchmaster

The Touchmaster pad comprises a grey plastic case measuring 350 × 330 × 30mm with an A4 size, black plastic touch-sensitive membrane in the centre. Also included in the package are a mains transformer, connecting lead, graphics stylus, user guide and an applications program called *Multipaint* plus an overlay.

The Touchmaster has both parallel and serial ports for connection to various micros. The Beeb version uses the BBC micro's RS423 port (data transfer is at 9600 baud). Power is obtained from a remote 6v PSU. A power indicator LED is provided to remind the user that the unit is ready for use. There is no grid of touch-sensitive pads, but instead the whole 210 × 297mm area is pressure sensitive, giving 256 × 256 resolution and a total of 65,500 individual co-ordinates. In this configuration the Touchmaster seems to lend itself to graphics applications. Without having any other software provided for review, it was difficult to ascertain how areas may be defined for the multiple 'key' input necessary for young children.

The 11-page user guide is a model of brevity, and useful information is conspicuous by its absence. An eight-line Basic program is listed and this is supposed to demonstrate how the Touchmaster works with the computer. It enables the computer to read co-ordinates from the Touchmaster, scale and display them on the screen. No information or help is offered on how to adapt the user's programs to work with the Touchmaster. No doubt experienced programmers could cope, but beginners are left high and dry.



Touchmaster: limited applications

KEYPAD HINTS

Here are some tips for readers considering buying a touch-sensitive keypad.

● Where possible cover all overlays in clear plastic laminate. You then only need to wipe the overlay with a damp cloth to remove grubby finger marks.

● Don't use sellotape to fix the overlay to the keypad. A bit of Blutak in each corner does a far better job.

● If you have an A4 Concept Keyboard and are thinking of purchasing an A3 model you may wish to convert your existing overlays to use with the larger model. Enlarging on a photocopier does not produce a correct A3 overlay. The only way to achieve this satisfactorily is to trace the A3 keypad and mark those pads which correspond to the A4 overlay. The tracing can then be transferred to a new (blank) overlay. Star Microterminals provides special transfer sheets for this purpose.

● As a safety precaution for the host micro, don't clip the connector to the Concept Keyboard socket. Should the keyboard be knocked to the floor (as happens in a busy classroom), then the plug simply pops out. The alternative can result in the micro also being pulled and possibly damaged.

The *Multipaint* program is included to demonstrate the Touchmaster's capabilities. It is a graphics package which enables simple pictures and designs to be created with the help of a plastic stylus. The overlay provides a menu from which a range of options may be chosen. This method of creating graphics is almost identical to that using a light pen, the only difference being that the Touchmaster replaces the screen. As my class are accustomed to using light pens in this way I decided to let them do the reviewing of this program.

All the expected features are included in *Multipaint* – free-hand drawing, lines, simple regular polygons, circles and points. Line-drawing is provided with a 'rubber-band' line to aid accurate fixing. In addition, there are five brush types and nine brush widths which, used in combination, provide some attractive effects. 'Blobs' and 'free dots' also give rise to some interesting patterns. The fill routine is extremely fast. Screens may be saved and loaded with specified filenames. Not unexpectedly, the program uses mode 2 with its full complement of 16 colours.

However, as is often the case with first generation software of this type, here are a number of small bugs and not a few shortcomings. At times it is necessary for the children to exert a good deal of pressure to elicit a response from the Touchmaster. Several facilities are sadly missing from this package – erasure of an error immediately after its execution, and the ability to input text on the picture are essential elements in a serious graphics program. Also, there is no option to dump a screen to a printer. Overall, *Multipaint* is rather disappointing and does not live up to the claim that it has 'many serious applications'.

With the software presently available, it's difficult to see how the Touchmaster could be used in a productive way. At £150 it appears overpriced and limited compared with the other keypads reviewed. Perhaps when more software appears on the scene the range of applications may increase and make it a more viable proposition. However, I am still not convinced that the Touchmaster represents value for money.

At the moment the software support for the Presfax 100 and Touchmaster is thin on the ground but there are some very good educational software packages available for the Concept Keyboard. I'll look at some of this software in the next issue.

Increase your fire power!

More than just a joystick—a system

- ▲ Nylon encased—Steel shafted joystick with ball and socket joint.
- ▲ Fast sprung return to centre.
- ▲ Graphite wiper linear potentiometers.
- ▲ 12 Months Guarantee.
- ▲ 7 day Money back Guarantee (on Hardware).

Complete control at your fingertips

A superb joystick and a keypad for the price of either one. Plus the software to integrate it into the computer's system. One handset will work on it's own in the A/D port as a joystick and two fire buttons. Joystick is immediately compatible with ACORNSOFT and similar software.

The interface joins together the analogue and the user ports to use the full keypads giving a total of 24 user definable keys. The interface can also be used as a splitter for the A/D port to take two items at the same time, e.g. joystick and lightpen.

DELTA DRIVER on cassette or disc: Two programs on each cassette or disc. One converts machine code programs from the keyboard to the joystick or keypad, with adjustable sensitivity on the joystick and will run on any O.S. The second program (needs O.S. 1.0 or later and an interface) duplicates any keyboard keys on the keypads, in the operating system, so that it can become a numeric keypad or will take on the function keys.

Numerous stockists nationwide or direct from us.

SAE for more detailed information.



Made in England

DELTA 14b HANDSET £14.95
DELTA 14b/1 A/D/USER PORT INTERFACE £14.85
DELTA DRIVER CASSETTE £5.95 or DISC £9.95
Prices include VAT and P&P.

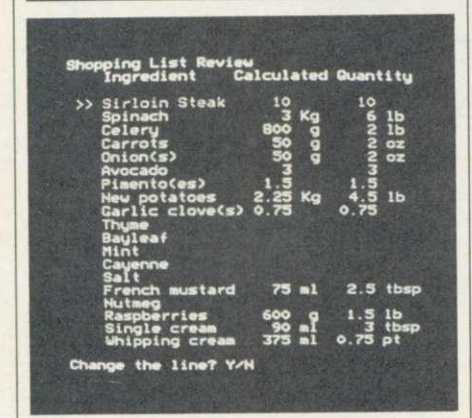
Voltmace delta 14b

VOLTMACE LTD
PARK DRIVE
BALDOCK
HERTS
SG7 6EV
Tel: (0462) 894410

Access · Barclaycard Visa

Callers welcome at the factory—Monday to Friday.

Menu-driven meals



'Comp-u-cater', Shumwari Associates, 12 Marlin Court, Marlow SL7 2AJ, tel: (06284) 5751, disc £24.95

A DATABASE dedicated to recipes and their ingredients, *Comp-u-cater* enables the user to create a menu chosen from the wide range of dishes held on the disc, find the correct recipe for each, annotate the quantities of ingredients required, scale the quantities according to the number of people eating and then produce a shopping list.

As with all programs dedicated to a specific purpose and containing a great deal of data, this one takes some getting used to. There are many options to choose from and you need to play with the program for a while before you feel confident enough to use it. The program contains a wide selection of possible ingredients, classified as to use and also by measurement type.

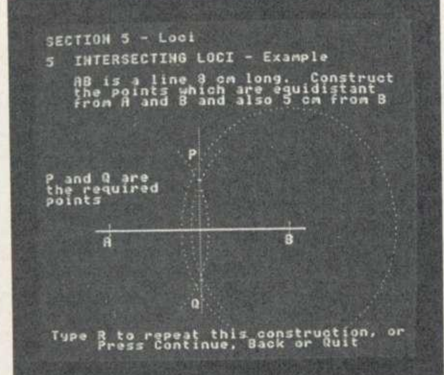
The hardware needed for this program is quite extensive as it requires a printer and, being disc-based, a disc-drive.

Not only may the in-built menu database be accessed, but there is also an opportunity for the user to create his/her own database with editing facilities to alter existing recipes. The whole structure is the familiar tree with the branches going out from the main menu page to the following:

Savouries, starters and soups 36 choices;
Main dishes 96 choices;
Vegetables 36 choices;
Accompaniments 24 choices;
Desserts 36 choices.

These subsequently lead to further sub-divisions into the categories under each main heading.

The flexibility of this program allows the computerised cook to program his/her way to culinary success, either within the confines of the author's recipes or by substituting new ones. **Nick Evans**



Building up to O-levels

'Construction', Ampalsoft, PO Box 19, Knutsford, Cheshire WA16 OHE, tel: 056 589 3563, £6.95

AMPALSOFT don't undersell themselves in their blurb – 'A brilliantly designed series of action-packed exercises that skilfully eliminate the traditional drudgery from maths examination revision' – but their documentation leaves a good deal to be desired and these are demonstrations, not exercises. The four page booklet with this cassette does not tell you in any detail about what is included in the program, where it is to be found or how the construction may be done. Everything relies on the program, so you can't check halfway through a complex construction how one of the more minor constructions was performed.

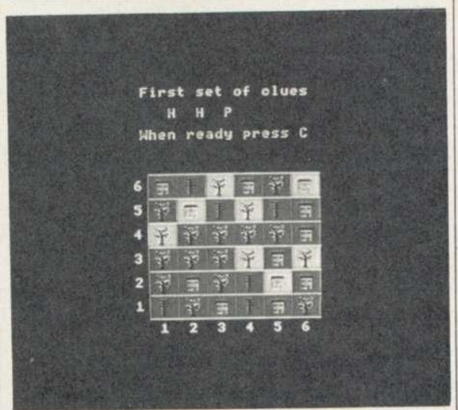
Having said that, the presentation is very clear and quite methodical in its exposition – except for the main menu which is unreadable (why do people insist on using yucky green on white?). There is no testing facility, however, since the program is designed to be solely instructive. The only interaction is pressing 'c' or 'Space' to step the program on.

One comment made to me by a teacher was how did this differ from a text book? I replied that it was dynamic – it showed the construction developing – but when all is said and done, it's simply the machine drawing arcs, bisectors, tangents and loci slowly, and in a text book these would be printed, usually with tests too.

This may be useful as a demonstration tool for groups in the classroom and as a revision aid, but the language is simply that of text book geometry and there seems to be little advantage for the less able O-level student using this. It's quite clear and well presented – if you already know what you are doing.

Nick Evans

Thinking things through



'Games of Deduction', Fernleaf Educational Software, Fernleaf House, 31 Old Road West, Gravesend, Kent DA11 0LH, tel: (0474) 59037, £35.95 (disc or tape)

LOGICAL reasoning programs have been quite popular in the educational market although they have tended to lack direction. This suite of four programs from Fernleaf is intended to 'help foster some aspects of the logical thinking process', and all the problems are of a remarkably similar nature but with slightly differing objectives.

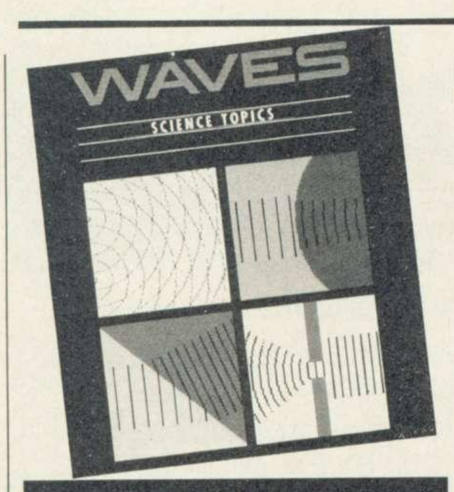
'The Perfume Hunter' engages a group of children in a search through a grid for a given number of bottles, using a tracker dog. The group must develop its own strategies for finding the maximum number of bottles in the minimum number of moves in order to move up the league table of difficulty.

'Deliver the Message' also entails planning your way through a grid in the swiftest fashion, avoiding traps and guards by seeking out friends who will inform you about the location of the perils. Logical thought is needed.

In 'Find the Lady' you must study another grid filled with pictures and analyse clues as to her whereabouts. Three or four squares around the Lady's position are described and then the sequence is repeated for the squares immediately above or below.

Finally, 'Name the Square' has yet another grid – this time to be filled with colour. The players are told how many squares of each colour are present, and they may then either ask questions or make statements in order to fill the grid. One simple rule applies – the same colour may not be on horizontally or vertically adjacent squares.

These games are very good ideas with much educational thought and clear documentation, but whether the market is willing to pay the high asking price remains to be seen. **Nick Evans**



Riding the crest of a wave

'Waves', BBC Soft, BBC Publications, Schools Orders Section, 144 Bermondsey Street, London SE1 3TH, 40 track disc £14.95

DEVELOPED in conjunction with the BBC Schools Television *Science Topics* series, this package consists of a suite of programs supplied on two 40-track single-sided discs. Wave propagation and reflection are dealt with on one disc; reflection, interference and diffraction on the other.

A 40-to-80 track conversion program is included but a 40 track drive is still required to make the initial backup of the original discs. With this available, we found no difficulty copying both discs on to the two sides of an 80-track disc and then modifying the menu to access both sides.

Waves illustrates most of the wave properties that can be demonstrated on a school ripple tank and is best considered as a supplement to this rather than a substitute. The package is designed with the emphasis on simplicity. Parameters such as wave speed, wavelength and angle of incidence are chosen by single keystrokes from a menu or by using the function keys.

The animated graphics are bold and straightforward – wavefronts are shown as white lines on coloured backgrounds with different backgrounds for various wave speeds. Close up the animation is irritatingly jerky, but on stepping back from the monitor I discovered that, with the exception of the green background used for the slowest wave speed, the display was easily visible from the back of the classroom and movement appeared quite smooth.

Other choices available are: plane or circular wavefronts, plane or curved reflecting surfaces (reflection), plane or curved medium boundaries (refraction), wavelength and slit separation (interference), and slit width (diffraction). There are several facilities including the ability to freeze and to single-step the wave motion.

There is also a facility to print the screen on an Epson printer. This is a wonderful idea to anyone who has ever had to draw an interference pattern by hand, but why does the screen dump insist on sending both a CR *and* LF at the end of each graphics line? The inclusion of the line feed requires that the Epson's response to this character be switched off at the printer to avoid double spacing.

Refraction is always difficult to demonstrate convincingly with a ripple tank and this is one area where the package can usefully fill some gaps. I was especially impressed with the ability to exceed the critical angle and to show the onset of total internal reflection. On the other hand, it's a pity that the program cannot cater for a *pair* of medium boundaries to demonstrate prisms and lenses.

Put to the classroom test, this well-documented package proved to be one of the few computer teaching aids that really works, where the micro becomes an efficient but unobtrusive tool.

Tony Merrett

Story-telling tales

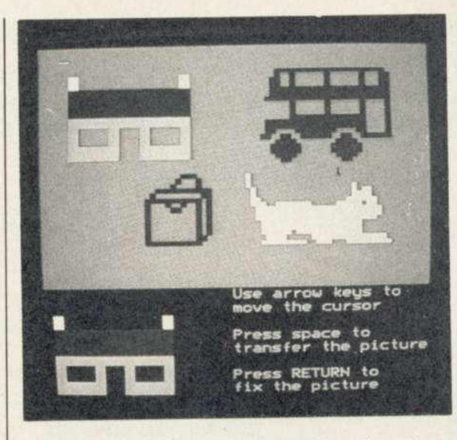
'Story', H & H Software, BBC B, £6.50, disc £7.25.

THIS menu-driver program enables children to write stories and illustrate, save and print them. Old stories can be reloaded and altered.

The tape or disc includes a three-page story called WALK, and the instructions for loading this and making alterations to it form the basis of the first part of the 16-page handbook. Changes can be made by using the cursor control keys and overtyping, or by using the Delete key.

Automatic wraparound is provided, and if the story is more than four lines long the text size shrinks to make room for up to seven lines. It's also possible to add pages to the story, up to a maximum of seven.

The pictures can also be added to, using either the suite of 64 pre-programmed pictures, or the 'draw your own' option. Access to the suite of pictures is quite easy. A list is scrolled across the bottom of the screen and when the required picture is spotted the pupil presses the space bar, then types in the name of the picture. This then appears at the bottom left of the screen. The cursor control keys are



then used to position it on the drawing area.

Once completed the story can be saved to cassette or disc and can also be printed out. Included in the program are routines to work with Seikosha and Epson FX and RX printers, and memory space has been set aside for other printer routines to be added.

I was attracted to *Story* as a means of enabling slow-learning pupils to write and illustrate short stories. On first viewing the program it seemed to have potential in this area, but subsequently I began to have doubts.

The program allows up to seven pages for each story. If the text is up to four lines long it's printed in double height. The inclusion of a fifth line causes the text to revert to single size, and up to seven lines may be accommodated. I found that text being entered on a new page was only printed in double size if the picture had been drawn first, even though text and graphic space was already allocated on the screen. This may seem a minor point, but the sequence in which individual children work through a story-writing exercise should not be predetermined in this way.

The remainder of the text handling facilities are reasonably easy for children to understand, and there are options of overwriting or deleting text. This is quite adequate as an introduction to wordprocessing and more complex editing facilities would make the program too difficult for the children it's aimed at.

The picture-drawing facilities are the weakest part of the *Story* package. They are too sophisticated for all but the brightest pupils in its target age range. The 'draw your own' option is obviously intended for older children but for them the text handling part of the program would be limiting.

On the whole I think the package is a reasonable attempt to combine simple wordprocessing with a graphic element, its main disadvantage being the lack of simple controls for the graphics.

B Steeper

R.S.D. CONNECTIONS

CONNECTORS IDC

	Card Edge	(Transition) PCB	2 Row Socket
10-way	£1.20	£0.85	£0.80
14-way	–	–	£0.90
16-way	£1.60	£1.20	£1.00
20-way	£1.90	£1.35	£1.20
26-way	£2.40	£1.60	£1.45
34-way	£3.10	£1.95	£1.60
40-way	£3.40	£2.00	£1.85
50-way	£3.85	£2.25	£2.00
60-way	£4.80	£2.60	£2.25

IDC SHROUDED HEADERS WITH EJECTING LOCKING ARMS

	Straight	Right Angle
10-way	.85	.90
14-way	£1.00	£1.20
16-way	£1.25	£1.45
20-way	£1.40	£1.60
26-way	£1.70	£1.95
34-way	£2.00	£2.30
40-way	£2.15	£2.45
50-way	£2.30	£2.65
60-way	£2.45	£2.85

IDC D CONNECTORS

	Male	Female
9-way	£2.70	£3.20
15-way	£3.20	£3.70
25-way	£3.80	£4.45
37-way	£5.90	£6.80

IDC AMPHENOL

(Centronics)

36-way plug	£4.95
36-way socket	£5.95

PRINTER LEADS

ALL 1 METRE LENGTH

BBC	£9.95
BBC serial	£8.95
AMSTRAD	£16.75
MEMOTECH	£12.75
EINSTEIN	£12.75
IBM PCC	£15.95
SPECTRUM interface 1 to RS 232	£9.75
SPECTRUm interface 1 to Centronics	£10.75
CENTRONICS to Centronics	£15.20
DRAGON	£9.95
QL	£10.75

COMPUTER LEADS

Dual disk drive 1m	£10.25
Single disk drive 1m	£7.25
7 pin DIN plug to 2x3.5mm 1x2.5m Jack plugs	£2.25
5 Pin DIN plug to 2x35mm 1x2.5mm Jack plugs	£2.20
6 Pin DIN Plug to 6 Pin DIN Plug	£1.95
2x3.5mm Jack plugs to 2x3.5mm Jack plugs to	£1.25
7 Pin DIN plug to 5 pin DIN plug	£1.95
7 Pin DIN Plug to 3 pin DIN plug and 2.5mm Jack plug	£2.25
7 Pin DIN plug to 7 Pin DIN plug	£2.25
5 Pin Domino Plug to 5 pin Domino plug	£1.95
Phono Plug to Coaxial TV Aerial plug	95p

D CONNECTORS

Solder Bucket	Male	Female
9-way	.75	£1.00
15-way	.95	£1.50
25-way	£1.50	£1.90
37-way	£2.40	£3.25

HOODS .95

RIBBON CABLE (Price per ft)

	Grey	Rainbow
9-way	.13	.24
10-way	.15	.28
14-way	.18	.32
15-way	.20	.36
16-way	.22	.40
20-way	.30	.50
24-way	.36	.60
25-way	.40	.65
26-way	.45	.70
34-way	.60	.80
37-way	.65	.85
50-way	.70	.90
50-way	.95	£1.25
60-way	£1.10	£1.40
64-way	£1.15	£1.50

DIP HEADERS

Pins	
14	90p
16	£1.00
24	£1.40
28	£3.95
40	£2.15

BBC MONITOR STAND

Heavy-duty stand
Vinyl covered in BBC, covers to match
ONLY **£12.95** + £2.30 p&p

EDGE CONNECTORS

2x23-way (ZX81)	£1.85
2x28-way (Spectrum)	£2.10
2x6-way VIC20/64	£1.20
2x12-way	£1.60

DOUBLE SIDED PLUG BOARDS

ZX81 23-way	£1.25
Spectrum 28-way	£1.50

BBC JOYSTICK

DELUXE JOYSTICK for BBC MICRO. Fits directly into BBC Micro analogue port

£12.95

TELEPHONE CONNS

Surface master jack socket	£3.75
Surface extn socket	£2.50
Dual outlet adaptor	£4.25
Line jack cord 3mtr	£1.85
BT jack plug	48p
4 core cable per metre	15p

All surface units shuttered BT approved.

MONITOR LEADS

BBC 6-pin to start plug	£4.95
BNC plug to phono plug	£2.95
QL to colour monitor	£4.95
QL to mono monitor	£1.25

SPECTRUM EXTENSION LEADS

6 inch extension calbe M to F	£10.50
6 inch M to 2 F's	£14.75
12 inch extension cable M to F	£10.75

Other convigurations made to order
Write or phone for quote

CUSTOM ASSEMBLIES

ANY COMBINATION OF IDC & RIBBON CABLE LEADS MADE TO ORDER

TRADE ENQUIRIES WELCOME

Please add 15% VAT

Free p&p C.W.O. or use

R.S.D. CONNECTIONS LTD. Dept. AU5
Telephone: 0920 5285

Formerly trading as Computer Link U.K.

FAST REPAIRS FOR THE BBC MICRO BY



THE ACORN APPROVED SERVICE CENTRE
191 FRESTON ROAD
LONDON W10 6TH
PHONE: 01 968 9214

- **SPEEDY REPAIRS ON CUMANA/ACORN DISC DRIVES & MICROVITEC MONITORS**
- **ALL REPAIRS FULLY GUARANTEED**
- **EXTENDED WARRANTIES AVAILABLE ON ALL YOUR EQUIPMENT**
- **ANY UPGRADE OR MODIFICATION CARRIED OUT BY EXPERIENCED ENGINEERS**
- **BBC COMPATIBLE CUMANA DISC DRIVE DEALERS**
- **AUTHORISED ECONET SYSTEM INSTALLERS AND SUPPLIERS**
- **VARIOUS ACORN PERIPHERALS ALSO AVAILABLE FROM MICROFIX**

RING 01-968 9214 AND ASK FOR MARK DUFFILL OR DEREK MULLINGS

★ ASTRONOMY ★

'SKY-BABY' is a highly sophisticated scientific program running on BBC-B (cassette loading). It caters for astronomers ranging from complete beginners to advanced amateurs and aspiring professionals, and for educational institutes.

'SKY-BABY' 's many features include:

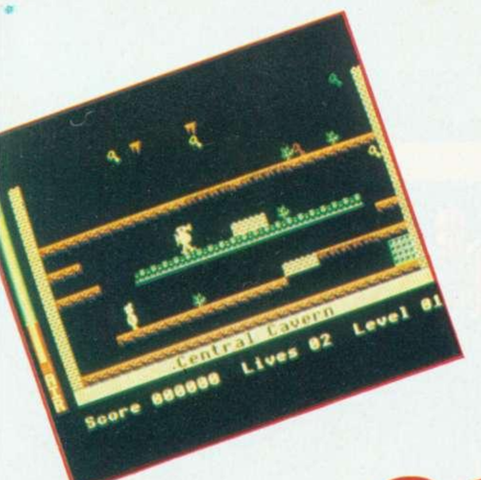
★ Colour and brightness coded display of stars, planets, sun and moon in selected area of sky
★ View from any position on earth, any date and time specified by user
★ A library of all stars down to magnitude 4.0 (i.e., 469 stars) including coordinates, magnitudes and names
★ Orbital parameters of planets: sun and moon positional formulae
★ Star sizes plotted to indicate brightness; sun, moon and planets colour coded
★ Moveable 'space probe' to identify name and details of any object displayed on screen
★ Details of current position, rising and setting times of any selected object: provision for an additional user-specified object, e.g., known comet, galaxy, radio source, etc.
★ Detailed User Guide: sections on program use, astronomical nomenclature and positional astronomy, formulae used, fully annotated expanded program listing, etc., etc.
★ Auxiliary program to analyse and list contents of stellar library
★ Unhindered access to Author by phone most times: callers welcome

'SKY-BABY' package, consisting of C10 Cassette containing three files (program itself, stellar library, auxiliary program), and 35-page User Guide **£12.50** inclusive

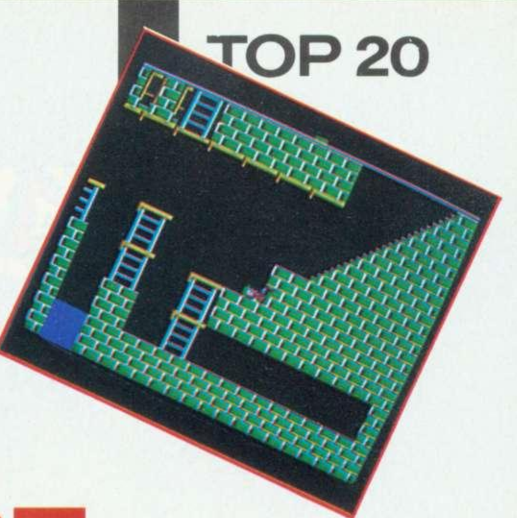
Instructions for disc running, and running on Electron available on request.

payable to:

STELLAR ENTERPRISE, 84 Dudsbury Road, Ferndown, Wimborne, Dorset, BH22 8RG
Phone Bournemouth (0202) 575234







SOFTWARE CHART

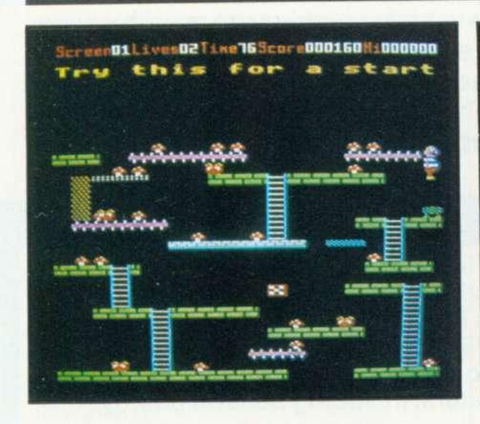
	TITLE	PUBLISHER	PRICE	MICRO	REVIEWED
1 (–)	Castle Quest	Micro Power	£12.95 (£14.95)	B	March '85
2 (1)	Elite	Acornsoft	£14.95 (£17.95)	B/E	October '84
3 (3)	Blockbusters	Macsen	£7.95	B/E	
4 (5)	3D Grand Prix	Software Invasion	£9.95 (£11.95)	B	February '85
5 (4)	Sabre Wulf	Ultimate	£9.95	B	
6 (2)	Frak!	Aardvark	£8.90	B	September '84
7 (8)	Pole Position	Atarisoft	£9.99	B	February '85
8 (9)	Football Manager	Addictive	£7.95	B	March '85
9 (10)	Manic Miner	Soft Projects	£8.95	B	May '85
10 (6)	Scrabble	Leisure Genius	£12.95	B	
11 (7)	Eddie Kidd's Jump Challenge	Martech	£7.95	B/E	March '85
12 (–)	Combat Lynx	Durrell	£8.95	B/E	
13 (re)	Mr Ee	Micro Power	£6.95 (£9.95)	B	March '85
14 (17)	Chukkie Egg	A&F	£7.95	B/E	September '84
15 (12)	Jet Pac	Ultimate	£7.95	B	
16 (re)	Aviator	Acornsoft	£14.95 (£17.95)	B/E	May '84
17 (20)	Snooker	CSM/Visions	£8.95	B	
18 (19)	Hobbit	Melbourne House	£14.95	B	
19 (re)	Micro Olympics	Database	£5.95 (£7.95)	B/E	
20 (re)	747 Simulator	Dr Soft	£7.95	B	

B = BBC. E = Electron. re = re-entry. Prices in brackets are for disc version.

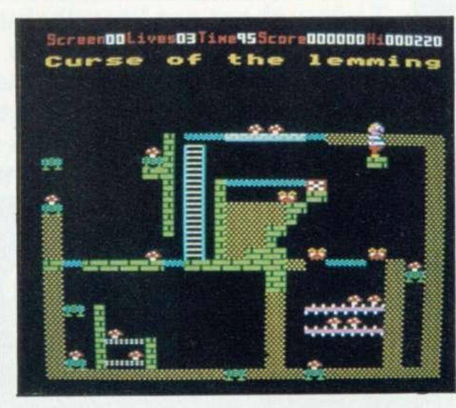
BUBBLING UNDER

Emerald Isle	Level 9
Gold Digger	Firebird
Swag	Micro Power
Chartbuster	Alligata
Challenger	Mastertronic
Mini Office	Database
Music System	Island Logic

Compiled by RAM/Computer







The key: select using the number or letter specified above

Use cursor keys to move graphics cursor around

0123456789ABCDEF
SHIFT repeat cell
move cursor
RETURN finalise
TAB test
Fairground fun

Tab to test
Return to analyse

Screen title

Finishing point

Conveyor belt – left and right moving

Slide

Ice

Ladder

Trampoline

Graphics cursor

Bricks

Eating your way out of trouble

'Magic Mushrooms', Acornsoft, £12.95

A GAME that encourages you to swap screens with your friends can't be all bad, especially when it's this latest stunner from Acornsoft.

The hero of this fungoid adventure is a Harry Sinclair look-alike sprite, whom you must guide around a series of obstacles picking or eating (I'm not sure which) mushrooms as you go and advoiding the red meanies who scamper to and fro with a mind of their own.

Magic Mushrooms is a platform game, the sort where you need to climb and ramble all over the screen as you collect points, avoid death, and work your way back to the starting position, all within a hectic 100 seconds time limit – phew!

There are nine screens and you can choose which you want to play around with. They have titles such as Fairground Fun, Non-stick Nightmare and even the Curse of the Lemmings.

This game's originality lies in the fact you can design and edit your own screens. Using one of the ready-made screens, you can move the 'part' cursor to the desired position and select the part you wish to insert from the graphic menu of 15 items at the top of the screen. You get a good assortment too. Standard bricks are easy, but slippery customers will appreciate the ice – Torvill and Dean are in no danger with my rendition of *Bolero*, but our hero can cope with the aid of some nifty key controls. One of my favourites is the conveyor belt – it's slow going, rather like walking up an escalator the wrong way but if you ease up you're shot off in the opposite direction!

Getting onto higher levels is not always easy either. Ladders help but that's too simple a solution; try the trampoline – it's a classic.

Moving downwards can be undertaken in a variety of ways. There's the gravity-assisted method – not to be advised, though, as you end up loosing one of your three lives. However, the superb judder you get on crashing to the floor is almost worth it. It's possible to construct slides, but they are slow and meanies can stroll over and wait at the bottom for you.

The rocking platforms are quite nauseating, as is the thin ice which disappears as you walk on it.

Once you have designed your screen you can give it a test drive. Pressing TAB makes random mushrooms appear, then off you go, using just three keys.

Too hard or too easy? Just re-edit to the desired result, save it and post it to your mates.

What's magic about mushrooms? A lot. It's great stuff; go and buy it – you won't be disappointed. **Bruce Smith**

Setting out on the right track

'Gateway to Computing' Books 1 and 2, Ian Stewart, Shiva Publishing, 64 Welsh Row, Nantwich, Cheshire CW5 5ES, £4.95 each

THERE are plenty of Basic tutors on the market and another one might seem unnecessary, but close inspection of Ian Stewart's offering dispels such thoughts.

Targeted at the teenage market, this series aims to give the young computer owner the 'kick in the pants' needed to get started with Basic. The text ranges from the mildly amusing to the hilarious, with serious instruction on how Basic keywords operate wrapped up in a mixture of goonish-cum-Kenny Everett humour.



Several characters accompany you on the journey of discovery, with such unlikely names as Ivan Nokyablokov and Carlton Q Cashsnitcher. Sherlock Holmes and Dr Watson are your guides to debugging and their conversations cleverly present the user with an accurate and logical picture of the way programmers speak to each other while debugging programs.

The explanations are very clear, and there are summary blocks at regular intervals reminding you of what has been said, and tests involving either program creation or problem solving. Most of the programs are essentially frivolous, but they are intended to be simple, quick and effective examples, rather than to undertake tasks, which is not the purpose of these books. Any young person would be hard-put *not* to learn about Basic from working through them.

I have my doubts about using them in the classroom as in Book 1 the user is instructed to print 'get stuffed!' as part



of a program. One person to whom I showed the book objected, saying that she would never buy it for her child solely because of this. Extreme? Well it depends what you are looking for, but it did seem to lower the tone of an essentially good set of books.

As far as the actual programming content is concerned it really can't be faulted – one minor criticism is the constant use of LET which is an irrelevant keyword in BBC Basic. Otherwise, everything from STEP to STOP and DIM to DATA is covered in a thorough fashion.

Presented in a large format and clearly printed, these books represent excellent value for the teenage computer buff. **Nick Evans**

For new DFS users only

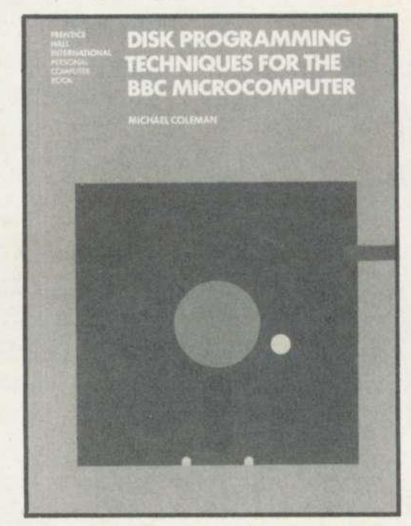
'Disk programming techniques for the BBC microcomputer', Michael Coleman, Prentice Hall International, £7.95

THIS book is aimed strictly at new users of the disc filing system, particularly the Acorn DFS, though two others are mentioned. Anyone accustomed to using and programming with the DFS will find little, if any benefit in it and this is my main reservation. Its useful lifespan will be one reading as it contains little you might refer to again.

The first half is an expansion of the DFS 'User Guide' and the sections on Basic handling of files in the main 'User Guide' – these books are much quicker and clearer reference sources. The author does, however, explain and expand on the various commands in a clear and amusing style, but it's a pity that he's made some mistakes.

Perhaps the worst omission is not to stress that a file called 'NAME' is the same as 'name' or 'NaMe' etc. I lost several programs this way in the early days when changing from tape to disc. A simple Basic program relocator is provided but there is no mention of the simple trick of changing PAGE to a lower value before loading.

The chapters on data files are more useful with descriptions of serial and random access; how they differ, when to use them, and some tricks such as linked records. However, once again errors creep in, particularly on just what the various Basic commands do. Obviously Mr Coleman didn't read my article in *Acorn User* trying to put the record straight! The oddest is about how to extend random access files (though for some reason he doesn't expect them to need expanding). It's really very simple; push the pointer PTR£ past the end of the file, and lo and behold it's bigger! The only problem is lack of space on the disc. Making an artificially long file with *Save or



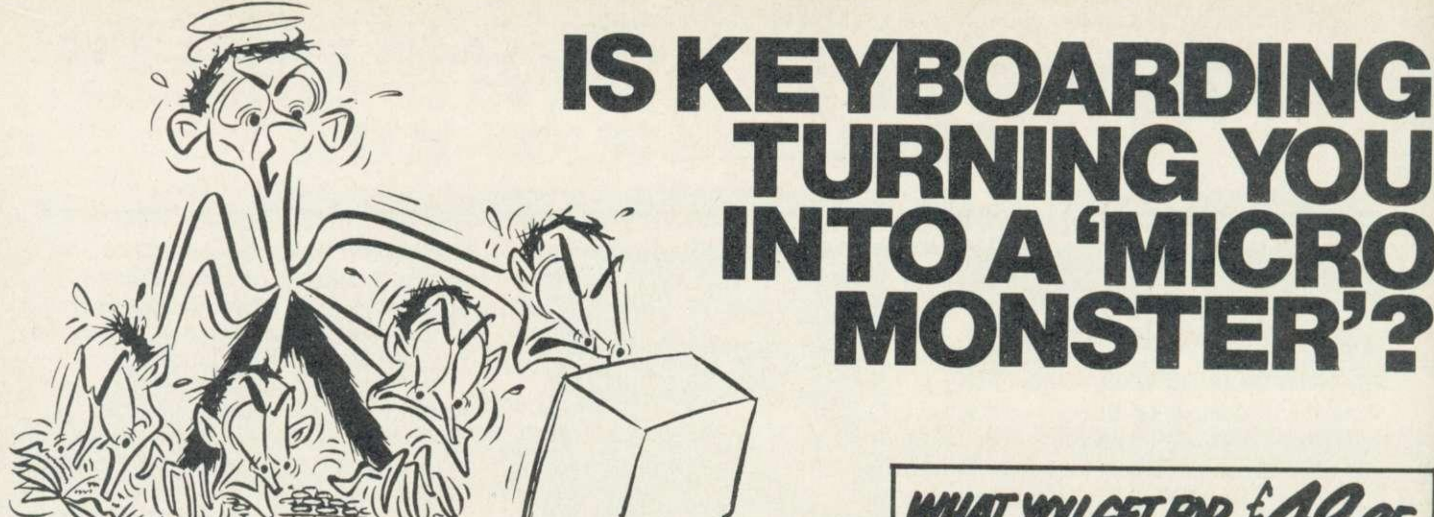
writing lots of dummy records makes the use of EXT# and EOF£ pointless.

The second half of the book consists of seven case studies, giving examples of ways in which the disc system can be used. These are well documented and could be used as a basis for more useful and user-friendly programs. The most helpful are the database programs, though the author insists on using *Save to create the file and thus limit its length. How are you supposed to know how big to make a file for data which may increase?

A disc with all these programs on is available separately along with a useful database of articles on the BBC micro. This is 40 track only, and contains at least one silly error (listed correctly in the book).

In summary, I was disappointed. In the early days of the BBC micro books understandably contained errors and omissions. Surely enough is now known, and indeed published, to expect a book to contain accurate and complete information. **Richard Harris**

IS KEYBOARDING TURNING YOU INTO A 'MICRO MONSTER'?



Let's face it, your BBC Micro is a demanding creature. Powerful it may be, but using the keyboard is probably a lot harder on *YOUR* system than you expected — and it's all because you're forced to 'hunt and peck' amongst 74 keys, on a keyboard that's a hundred years old!

It's no wonder you feel like the many-headed hydra! With your eyes being torn from document to keyboard, then to the screen for checking, and back again. Errors and bugs are bound to creep in.

Master your BBC Micro overnight with QUINKEY.



QUINKEY REPLACES EVERY CHARACTER, COMMAND AND FUNCTION ON YOUR BBC (EXCEPT BREAK), AND SIMPLY PLUGS INTO THE ANALOGUE PORT AT THE BACK.



YOU CAN TOUCH TYPE IN LESS THAN ONE HOUR WITH QUINKEY'S SIX KEYS, USING THE FAMOUS MICROWRITER TECHNIQUE PROVEN BY THOUSANDS OF USERS.



YOU ONLY NEED ONE HAND TO USE QUINKEY—AND THE LONG LEAD ALLOWS YOU TO SIT BACK, RELAX AND CONCENTRATE ON WHAT'S REALLY IMPORTANT—YOUR WORK.



ACCURACY AND SPEED COME NATURALLY BECAUSE YOU'RE TOUCH TYPING YOU CAN DEVOTE ALL YOUR CONCENTRATION TO READING ACCURATELY FROM THE SCREEN OR DOCUMENT.



AND, FOR THOSE LONG LISTINGS, QUINKEY REALLY IS A MUST. BECAUSE YOU NEED ONLY ONE HAND THE OTHER IS FREE TO FOLLOW DATA.

WHAT YOU GET FOR £49.95

1 QUINKEY KEYBOARD

Five keys (plus control key) pressed in easily remembered combinations, give all inputs except Break. Can be used in conjunction with BBC keyboard or as entire replacement.

2 QUINKEY INTERFACE



Four-channel connector for up to four Quinkeys.*

3 SELF-TEACH GUIDE



Contains everything you need to know. Instantly learned, simple mnemonics based on widely used technique of Microwriting ensure you're touch-typing in under an hour.

4 PROG & WP SOFTWARE



Supplied on cassette (User Guide shows how to transfer to disk).

PROG merges easily with applications programs. WP enables Quinkey to be used with word processing packages such as Wordwise, View and Edword.

TECH SPEC — When invoked using CHAIN "WP" or CHAIN "PROG", loads at the current PAGE value and moves PAGE up by 768 bytes. No zero-page locations required. Interrupt service vector IRQ2V, correctly chained.

TESTED COMPATIBILITY — BBC model "B" OS E.I BASIC I or BASIC II (except when using INKEY with negative argument), DFS 0.90. View A1.4, Wordwise 1.17, Edword.



So confident are we of our claims that we offer a 14 day money back guarantee. So act now by sending the coupon below.

Microwriter Ltd.,
2 Wandle Way, Willow Lane,
Mitcham, Surrey CR4 4NA
Tel: 01-685 0300

microwriter
QUINKEY



To: Microwriter Ltd., 2 Wandle Way, Willow Lane, Mitcham, Surrey CR4 4NA Tel: 01-685 0300

I would like to take advantage of your special money-back guarantee and realise that I can return the pack(s) undamaged within two weeks of delivery if I am not fully satisfied for a complete refund.

Please send ..... Quinkey pack(s) @ £59.95 (£49.95 plus VAT & p&p) £ ....

*Tick box ☐ More information about the educational pack of 4 Quinkeys and software for schools.

I enclose a cheque made payable to "Microwriter Ltd" for £ ....
or debit my Visa/Access credit card No. ....

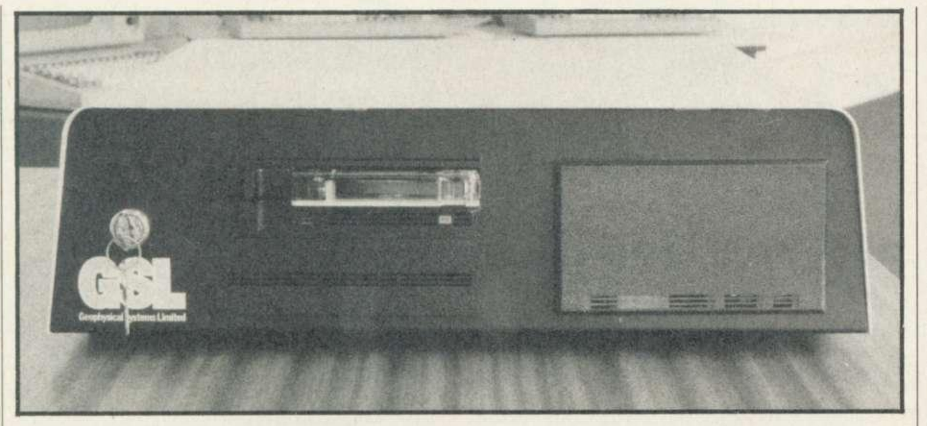
Signed ....

Name ....

Address ....

Please allow up to 28 days for delivery. Reg. No. 1374069

AU 5/85



Sophisticated system

GSL hard disc and net package for schools, Geophysical Systems, Westport Way, Andover, Hants SP10 3SG, tel: (0264) 59633, prices on request

IF YOU are using BBC micros in a school, or are interested in the use of hard (Winchester) discs with the BBC, our experience at Seaford College may be of value to you.

We teach computer studies at O and A level and all fourth formers have a weekly computer lesson. Until last year we used Level 1 Econet with our Beebs, a cumbersome system fraught with problems. We seem to have found a solution in the GSL system which gives you a reliable network as well as 5 to 20 million bytes of storage.

You use the normal Econet hardware in each station of the net and replace the Econet ROMs with E-net ROMs (£15 each). You install a fileserver ROM (£155) and connect that micro to the hard disc via a single cable from the 1 MHz (*not* disc, which is the same size) interface connector.

PAGE is set to &1900 in a BBC B (or &1400 in a model A) with floppy interface (not &1B00 as with Econet). You do not have to boot FS.

You can use the fileserver BBC almost as if it were not doing anything else. Anyone can send things to a printer connected to any station on the net. The default printer server is station 0 – this must be the fileserver. The station with the printer can be used almost normally while others are using the printer.

We no longer lose discs and things that we save to our backing store are still there the next time we try to load them. (Data on the hard disc can be backed up on floppy discs. More sophisticated backup devices are to be released shortly.)

I'll explain the file structure of the hard disc. If *CAT listed every file on the hard disc, you would soon be in trouble; the solution is a hierarchical file structure. There is a main catalogue, and from that you can go (or are automatically taken) to sub-directories, which in turn can lead to lower levels. Typically, each user would have a sub-directory of his own. Once logged on (an easy process) to his or her sub-directory, it would be difficult for the user to know if he or she was talking to a floppy or a part of the hard disc.

Having the hard disc – and the fileserver that comes with it – is like having a servant at the old Econet floppy drive to change discs for users. Users type *GOTO 23 to 'put disc 23 into the drive.' After that *CAT, SAVE, LOAD, etc work as if the user were connected to a floppy.

What about data privacy? Will Jones swipe Smith's program, or worse, *DELETE it? Not if Smith and Jones are peers. The system supervisor assigns passwords and priority codes to anyone who may save things on the system. Each user has one or more 'discs' of their own. Only senior (high priority) users may alter the contents of someone else's disc. You can't even see what's on someone else's disc unless your priority is greater than theirs.

What if you want someone else to see one of your programs? You must change the program's access code. *ACCESS PRGM 9 would make PRGM 'visible' (and loadable – but not deletable) to anyone with a priority of 10 or higher. This is useful for teachers – a file's priority can be set so that the file can be read by pupils but cannot be tampered with.

It's not necessary to give every user a password. Pressing 0/Break will give anyone read only access to any file with a priority of 0. *AUTO 8 will do what Shift/Break does with a floppy that has been configured to auto-boot. (The 8 says which 'disc' from the hard disc's surface will be booted.)

The manuals supplied are comprehensive and well organised. There is a user's guide for the general public, and a supervisor's guide which goes into such things as assigning passwords.

Our system is all contained in one room, but a 500m network is possible. So far we are only using the disc to replace our floppies, which doesn't exercise all the features of the system. It is provided with versatile *VIEW, *REMOTE, etc commands for a larger installation, or for more control, supervision or help by the teacher. Messages can be passed back and forth over the network between client stations and the fileserver.

Some calculations comparing the costs of floppy and 10 Mb GSL based-systems indicate that in terms of cash the break-even point comes at about 15 stations. Building a system around a hard disc saves you most of the trouble associated with floppies – no more missing discs, mysterious deletions, vulnerability to dust. The GSL hard disc's network must also count as a major benefit in choosing this option – the costing exercise did not include a printer for each station.

In favour of the floppy option, one could point out that if the hard disc were to go down, the calamity would be proportional to the number of stations attached to it. We are keeping some floppies for backing up work and emergencies. As long as the 'discs' of the hard disc look like floppies (size, filenames, number of files), one can *BACKUP from the hard disc to a floppy, and the data can be restored on to the hard disc as easily. At the moment, the floppy server must have the Amcon DFS in it, but GSL are working on this and the Acorn DFS will be acceptable soon.

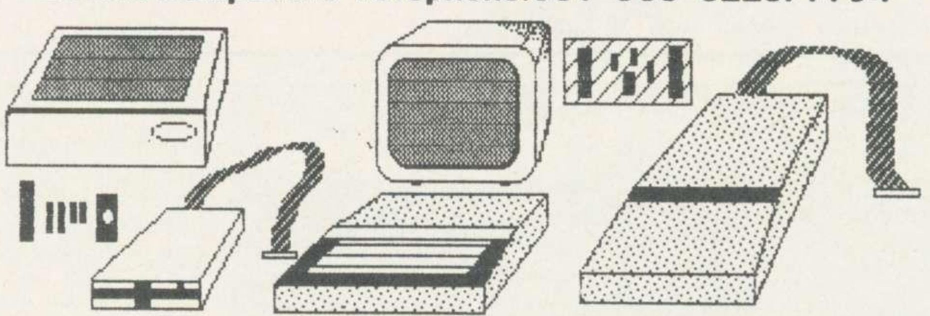
As far as alternative hard disc systems are concerned, SJ Research are building something which is more hardware intensive but more expensive. Torch do a hard disc, but to access it each of your Beebs must be fitted with over £300-worth of gear to make what comes out look like CP/N, (which is or is not CP/M depending on who you ask).

There are a few problems with the GSL. Catalogues are not in alphabetic order but this may be rectified in a later revision of the software. Until the fileserver doesn't require the Amcon DFS, there isn't a simple way to transfer data files from floppy to hard disc. The next version of the disc utilities (available to the supervisor only) should allow *COPY from an Acorn DFS floppy to the hard disc, I believe.

GSL has been unfailingly courteous and thorough in dealing with questions that have arisen. We have found that pupils learn the essentials of saving and loading files with a 15 minute lecture to the whole class and the supervisor can master his powers easily. **Tom Boyd**

BBC Microcomputer in the NORTH

CTECH Computers Telephone:061-366-8223/7794



Free Vouchers for up to £100 in Travellers Cheques on certain models

Computers	£ p
BBC Model B	227.39
BBC Model B with DFS	346.96
BBC Model B with DFS & Econet	414.35
BBC Model B with DFS & Wordwise	379.96

All computers come with Free Cassette Lead.

BBC Model B with DFS & 100K disc drives only £433.91

Acorn Equipment	£ p
6502 2nd Processor	£173.04
Z80A 2nd Processor	£346.95
Teletext Adaptor	£199.00
Electron Computer	£112.17
Electron Plus One	£47.78

Most add-ons include free fitting and installation.

Monitors	£ p
Ferguson Hi Res Green Screen	69.00
Ferguson High Res Amber Screen	74.00
Microvitec Medium Res	260.00
Microvitec Normal Res	199.00
Philips TV/Monitor	£199.00
Fidelity TV/Monitor	£199.00

Light Pens and Joysticks	
R. H. Electronics Light Pen	39.50
Joystick Pairs	17.35
Hi-Fi Extension Cable	5.17
Atari-type joystick for BBC	10.39

Components and Cables	
2764 Eprom	6.52
27128 Eproms	17.35
8271 Disk Controller	POA
BBC to Centronics Printers 1/2m	11.26/13.00
BBC to serial printer	13.00
Disk Drives Datacable	8.65
Disk Drives Power Cable	2.57
R.G.B. Cable	3.44
BBC to Ferguson Monitor Cable	3.44
Cassette Leads	4.78
TV Leads	2.57

DISKETTES

Boxes of 10 diskettes
XIDEX s/s d/d £15.22
XIDEX d/s d/d £16.09
XIDEX diskettes £15.22
Control Data d/s d/d 96 TPI £19.91
Control Data s/s d/d 96 TPI £14.74

'Storage boxes' £2.17

Printer Ribbons
Epson FX80/RX80/MX80 £4.34
NEC/Imagewriter Ribbons £5.21
Canon PW 1080A/KP 810 £7.82
Brother HR15 Multi-Strike £4.34

Addons	
LVL/Computer Village ROM/RAM board	39.50
HCR Electronics Eprom programmer	49.00
OEL 200 Prestel Terminal	59.00
Acorn Speech Synth	47.83
Chip Chat Speech Synth	26.04
Pace Grapevine	POA
LVL Music Keyboard	85.90

ROM Software	
Wordwise	34.74
Graphics ROM	28.65
Print Master	28.65
View 2.1	52.09
Ultra-Calc	56.48
1.2 O.S.	10.00
Disk Doctor	28.65
BCPL	86.09
Termi	28.65
Commstar	30.39
Viewsheet	52.09
Beebugsoft Toolkit	23.48
Spellcheck	17.35
ALL Beebug titles now in stock	
Starbase	59.00
Special Offer	
Gemini datagem	85.95

THIS MONTH'S BEST BUYS AT C-TECH.

SHUGART	40A 100K FULL HEIGHT 40T SINGLE-SIDED DISK DRIVE £69+VAT
TEAC	55F 400K 40/80T SWITCHABLE DISC DRIVE £149+VAT
FERGUSON	MM02/MM06 26 MHZ BAND WIDTH GREEN/AMBER MONITOR £69/£74+VAT
STAR	SG10 PRINTER NEAR LETTER QUALITY, EPSON RX80FT IBM COMPATIBLE
CANON	PW 1080A PRINTER NEAR LETTER QUALITY, EPSON FX80 COMPATIBLE P.O.A.

NO MAIL ORDER RISK WITH US (see below)

PRICES . . .

All our prices are constantly moving, so please ring us to check the latest price.

All prices plus VAT

FREE DELIVERY TODAY (Orders over £90)

If you are in Greater Manchester, Cheshire, Lancashire, Midlands, Merseyside, West Yorkshire or South Yorkshire, if you ring us now we can send one of our highly trained staff to install your computer equipment today.

(Pay only when you receive your goods)

C ☆ TECH
COMPUTERS



**184 Market Street,
Hyde, Cheshire
SK14 1EX
061-366 7794
061-366 8223**

Saving the human race

'Robotron: 2084', Atarisoft, BBC and Electron, £9.99

IN *Robotron: 2084* your task is to kill all sorts of nasties and save your fellow humans from the robots.

These robots attack in waves, and on the first, there are fifteen. You soon realise they are programmed to kill, and will simply come straight for you! Fortunately, you have a powerful weapon system – a rapid fire laser gun – and the first few screens are little problem. After the eighth, you can get into real trouble, however. There are so many different types of nastie coming at you, such as the red discs which take great delight in distributing what look like little bullet-throwing gravestones, and the brains which . . . well, see for yourself on level five.

Once you have exterminated everything that is killable on a level, you proceed to the next. If, in all the chaos, you manage to rescue some humanoids, there are large bonuses available which go a long way to a good score. Bonus lives are awarded every 20,000 points – you'll need them!

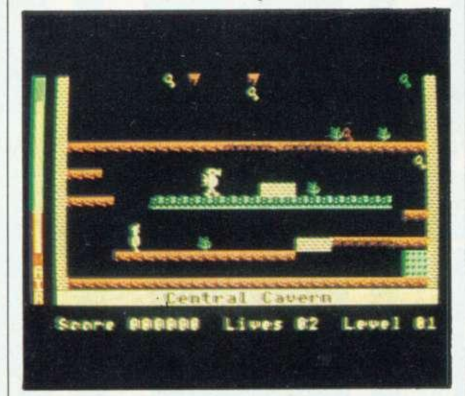
The graphic quality of *Robotron* is very good. There are many different aliens, and my greatest praise is for the sheer speed of operation, especially when you consider how much is going on at once. Almost everything moves, and the action is smooth. Sound is fairly good, too; there is a wide variety of noises and they are well implemented.

As usual in Atari's games, there are many options available to the player. You can choose a one- or two-player game and the sound can be switched off. It's also possible to start on any of the first nine levels, and to freeze the game. You can control *Robotron* by keyboard or one or two joysticks; the keyboard option is a little hard to get to grips with, as there are eight keys used – the two-joystick option may be easier for some.

Altogether, a fast action game, very difficult in later stages, with good graphics and sound, and which gives you a real feeling of achievement when you master the controls! A worthy addition to any shelf. **Stuart Menges**

Going underground

'Manic Miner', Soft Projects, BBC, £8.95



ONE OF the best known Spectrum games, *Manic Miner,* is now available for the BBC micro. The idea is to guide Willy the miner around a series of screens, collecting a set of objects, before his air-supply runs out. Once all the objects have been picked up, the exit begins to flash, and our hero moves onto the next screen. Usually, you pick up keys, but coins, bananas, etc are also found on some levels.

Once the game is loaded, a security code must be entered from a large number of combinations. If you wait, a demo runs, so you can see each screen in turn.

Controlling the character is simple, there are only three keys to worry about – Z and X move you, and you use <Ret> to jump.

As far as sound goes, there is an annoying tune, playing all the time, but the other sound effects are acceptable. Fortunately, Q will kill the tune but not the rest of the sound. Graphics are better, but not outstanding, and the movement is smooth. Some of the animation on later levels is very good – spinning triangles, mutant telephones, and, perhaps best of all, a bouncing cheque!

Each screen is well presented and designed, and has its own problems. The key to success is forward vision and precise timing. *Manic Miner* is already established on the best sellers list for the Beeb. At £8.95, it's on the expensive side but not too much above the inflated average. **Stuart Menges**

A-maze yourself

'Maze', Acornsoft, Electron version £9.20, BBC version £9.95 (disc £11.50)

SOME games, like *Snapper* and *Frogger*, have staying power. Another sure to join the ranks of the stayers is *Maze* from Acornsoft.

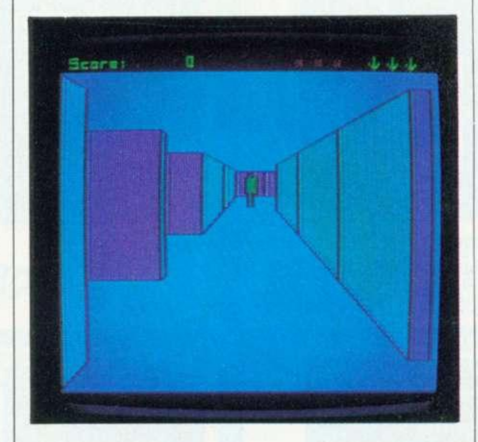
You have just entered a top-secret installation of a rival company with the aim of stealing some secret information. The baddies are robot guards who will, of course, shoot you on sight.

Your mission, should you decide to accept it, is to locate three secret keys scattered around the randomly-drawn 3D maze, and place them in the indestructable iridium box (what else?). Then you can take the new key within, work your way back to the lift and elevate yourself to the next level. Once there you are faced by an extra robot and a more complex maze.

The keys themselves are represented by different coloured squares situated on the floor. Should you happen to come across the iridium box in your travels, its position remains displayed on the plan view of the maze so that you can find your way back to it.

The maze itself isn't fancy but is very effective, scrolling steadily and without judder, and usually responding quite quickly. Pressing V supplies you with a plan of the parts you have already explored, with the robots and their respective positions shown.

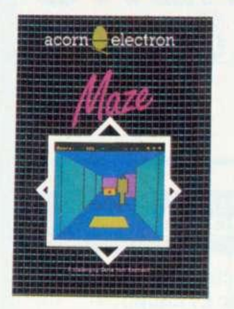
When a robot approaches, echoing footstep sounds emanate, and when it appears in the corridor before you, pressing F will fire one of your three bullets to blast it to smithereens (if it



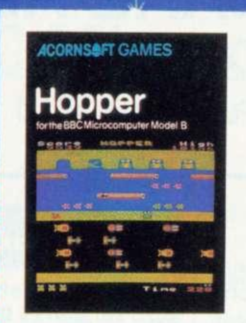
hasn't already beaten you to the draw). Shooting one doesn't really make things any easier, as it is immediately replaced by another robot.

Maze has certainly become my favourite pastime for the moment, and I'm sure I'll be playing it for some time to come. And if that isn't a recommendation, then I don't know what is!

Bruce Smith



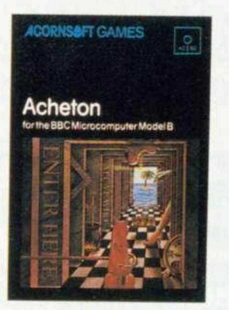
MAZE
Electron Cass SLG11 £6.99
BBC Cass SBG11 £9.95
BBC Disc SNG11 £11.50



HOPPER
Electron Cass SLG23 £6.99
Electron ROM SCG23 £14.95
BBC Cass SBG23 £9.95
BBC Disc SNG23 £11.50



MAGIC SHOW
Electron Cass SLX11 £6.99
BBC Cass SBX11 £9.95
BBC Disc SNX11 £11.50



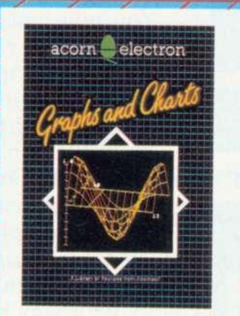
ACHETON
BBC Disc SNG37 £17.65



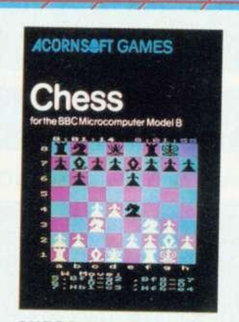
STARSHIP COMMAND
Electron Cass SLG22 £6.99
Electron ROM SCG22 £14.95
BBC Cass SBG22 £9.95
BBC Disc SNG22 £11.50



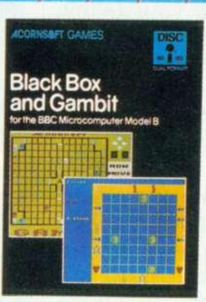
AVIATOR
BBC Cass SBG02 £14.95
BBC Disc SNG02 £17.65



GRAPHS and CHARTS
Electron Cass SLX02 £6.99
BBC Cass SBX02 £9.95



CHESS
Electron Cass SLG10 £6.99
BBC Cass SBG10 £9.95



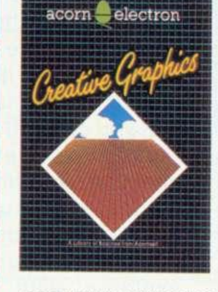
BLACK BOX & GAMBIT
BBC Cass SBG34 £9.95
BBC Disc SNG34 £11.50



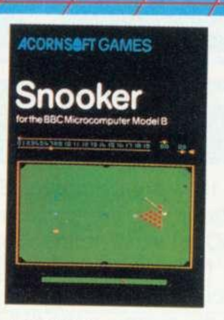
MONSTERS
Electron Cass SLG03 £6.99
BBC Cass SBG03 £9.95
BBC Disc SNG03 £11.50



FIREBUG
Electron Cass SLG39 £6.99
BBC Cass SBG39 £9.95
BBC Disc SNG39 £11.50



CREATIVE GRAPHICS
Electron Cass SLX01 £6.99
BBC Cass SBX01 £9.95



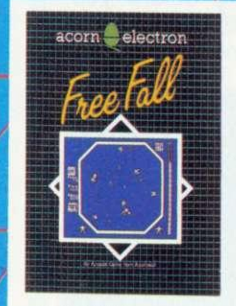
SNOOKER
Electron Cass SLG21 £6.99
BBC Cass SBG21 £9.95
BBC Disc SNG21 £11.50



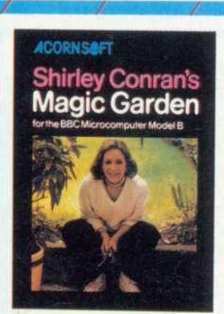
PICTURE MAKER
Electron Cass SLX03 £6.99
BBC Cass SBX03 £9.95
BBC Disc SNX03 £11.50



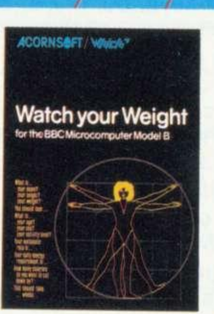
GO
BBC Cass SBC42 £9.95
BBC Disc SNG42 £11.50
Electron Cass SLG42 £6.99



FREEFALL
Electron Cass SLG28 £6.99
BBC Cass SBG28 £9.95
BBC Disc SNG28 £11.50



MAGIC GARDEN
BBC Cass SBX04 £9.95
BBC Disc SNX04 £11.50



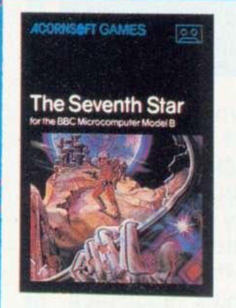
WATCH YOUR WEIGHT
Electron Cass SLX17 £6.99
BBC Cass SBX17 £11.90



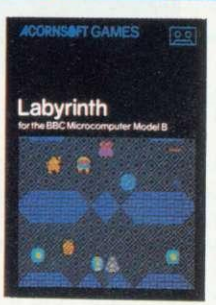


ELITE – the fascinating science fiction programme involving trading, combat, navigational and entrepreneurial skills.

Electron Cass SLG38 £12.95
BBC Cass SBG38 £14.95
BBC Disc SNG38 £17.65



SEVENTH STAR
BBC Cass SBG36 £9.95



LABYRINTH
BBC Cass SBG41 £9.95
BBC Disc SNG41 £11.50

ORDER BY PHONE



Telephone 0933 79300 between 9.30 a.m. and 4.30 p.m. Monday to Friday. Your order will be taken personally by our TeleOrder Sales Department – simply state your Access or Barclaycard Number and date of expiry.

ORDER BY POST

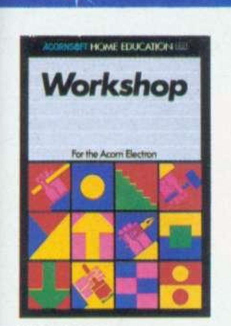


Complete the coupon indicating the title(s), type of software required and make of computer. Enclose your Cheque made payable to Vector Marketing Ltd. or give your Access or Barclaycard No. sign and send to address shown in the coupon.



If you would like a catalogue phone 0933 79300

VECTOR MARKETING LIMITED, LONDON ROAD, WELLINGBOROUGH, NORTHANTS NN8 2RL



WORKSHOP
Electron Cass SLE23 £6.99
BBC Cass SBE23 £9.95
BBC Disc SNE23 £11.50

YOU CAN NOW BUY THE COMPLETE RANGE OF ACORNSOFT CASSETTES·DISCS & ROMS FROM VECTOR

SUITABLE FOR THE BBC AND ELECTRON

ACORNSOFT
The Complete Cocktail Maker
for the BBC Microcomputer Model B

COCKTAIL MAKER
BBC Cass SBX10 £9.95
BBC Disc SNX10 £11.50

ACORNSOFT and VECTOR

Vector is the central distribution organisation for the Acorn Group including ACORNSOFT and associated software.
We will despatch your goods by First Class post within 24 hours of receiving your order.

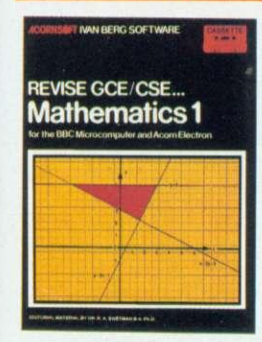
DON'T FORGET, VECTOR CAN OFFER THE COMPLETE RANGE.

SOMETHING FOR THE WHOLE FAMILY
•GAMES •EDUCATIONAL •BUSINESS •HOME INTEREST.

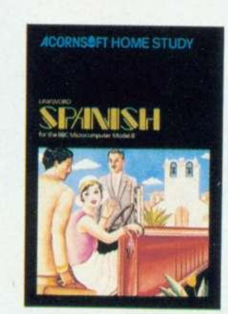
ACORNSOFT have an extensive range of computer programmes. Some require considerable dexterity to master, others are devised to assist in teaching a whole range of subjects at home or in school, suitable for all ages, while the Business Software is proven for industry and office efficiency.



LEARNING PROGRAMMES



MATHS 1
BBC Cass XBX09 £12.65



SPANISH
BBC Cass SBX15 £14.95



LET'S COUNT
BBC Cass XBE12 £9.95
BBC Disc XNE12 £11.50

IT'S SO EASY SIMPLY SNIP AND SEND!

FAST DESPATCH
By 1st Class post within 24 hours of receiving your order!

AC

Complete the order form inserting the codes and prices shown in this advertisement, or, from your catalogue and send to:
VECTOR MARKETING LIMITED, LONDON ROAD, WELLINGBOROUGH, NORTHANTS NN8 2RL

This order is for:

Title	Code	Price

To ensure that the correct items are sent tick which format you are using
BBC Cassette ☐ Disc ☐ Electron Cassette ☐ ROM ☐
Tick for Catalogue ☐

Company Reg. No. 1632455

Name ______
Address (to agree with credit card account) ______
______
______
______ Post Code ______
Telephone No. (in case of query) ______
Cheque enclosed for £ ______ or charge my Access/ Barclaycard A/c ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Signed ______
Expiry date of credit card ______ Tick if VAT invoice required ☐

SWEET-TALKING ▪BEEB▪

'Sweet Talker' speech synthesiser, Cheetah Marketing, 24 Ray Street, London EC1R 3DJ, tel: 01-833 4909, £24.95

Vincent Fojut lends an ear to a low-cost speech synthesiser

CHEETAH'S *Sweet Talker* speech synthesiser at £24.95 must surely be the most inexpensive way of adding synthetic speech to the Beeb. So just what do you get for the price, and how does the product shape up?

The hardware could hardly be simpler and less obtrusive. A small circuit board of some 3in by 2in holds the speech synthesiser chip (the popular General Instruments SP0256), and a modicum of external components.

The whole assembly plugs into IC99 on the Beeb's main circuit board via an IC socket mounted on extension pillars. The unit requires a fair amount of pressure to be driven home, and I would recommend that users unscrew the main circuit board from the Beeb's casing, so that it may be supported from the underside during insertion. This helps minimise the risk of hairline cracks appearing in the PCB tracks.

Since IC99 is very close to the ribbon cable connecting the keyboard to the BBC's circuit board, space is a little tight, but it should be possible to install the unit without exerting undue force on any component.

There are no tracks to cut, soldering to be done or awkward flying leads to connect. In fact, being so small, the speech synthesiser should not impinge on other hardware fitted inside the Beeb, such as RAM/ROM expansion boards, but check first!

The software accompanying the package consists of a cassette-based program, 'Beebtalk'. Not only does this provide an entertaining demonstration of the *Sweet Talker*'s capabilities, but the code is also meant to serve as an example of how to program the speech chip.

To generate speech, *Sweet Talker* uses an approach based on allophones, which can be considered as the fundamental building-blocks of speech. When fed with a number between 0 to 63, the synthesiser chip can generate one of 59 distinct allophones, plus 5 different periods of silence.

The allophone technique used in Cheetah's synthesiser does not produce particularly natural-sounding speech, as human speech is not, unfortunately, a series of discrete sound segments. The advantages, however, are that it is easy to program, very cheap, and should allow any English-language phrase to be synthesised.

In fact, the demonstration software goes even further, with humorous results. In addition to 'speaking' in English, the program attempts three other languages – French ('Bonjour'), German ('Guten Tag'), and that other well-known 'foreign' tongue, Scottish (yes, the inevitable 'See you, Jimmy'!).

The 'Beebtalk' program includes a short machine-code routine, together with examples of how to call it from Basic, to generate the words of your choice. It works in the following way. Take your phrase and break it into its constituent allophones, then convert these into their corresponding numeric codes, and embed the string of numbers in a DATA statement. By calling the machine code routine with each number in turn (for example, using a FOR . . . NEXT loop), the synthesiser chip should then generate the required sounds.

For example, the phrase 'Acorn User' can be built from the following allophones (using Cheetah's notation):

EY, KK3, OR, NN1, YY2, UW1, ZZ, ER1.

These, in turn, give the following numbers:

20, 8, 58, 11, 25, 22, 43, 51.

In practice, the string would probably be terminated with a 'silence' code, such as 0, which effectively turns the device off. Without this extra code, the synthesiser would continue generating the last sound issued, which can be very disconcerting!

While the above approach does work, it obviously has drawbacks. There is no clear correlation between the numbers used, and the sounds which they produce. Consequently, building up even quite short phrases becomes a tedious exercise of conversion and cross-referencing.

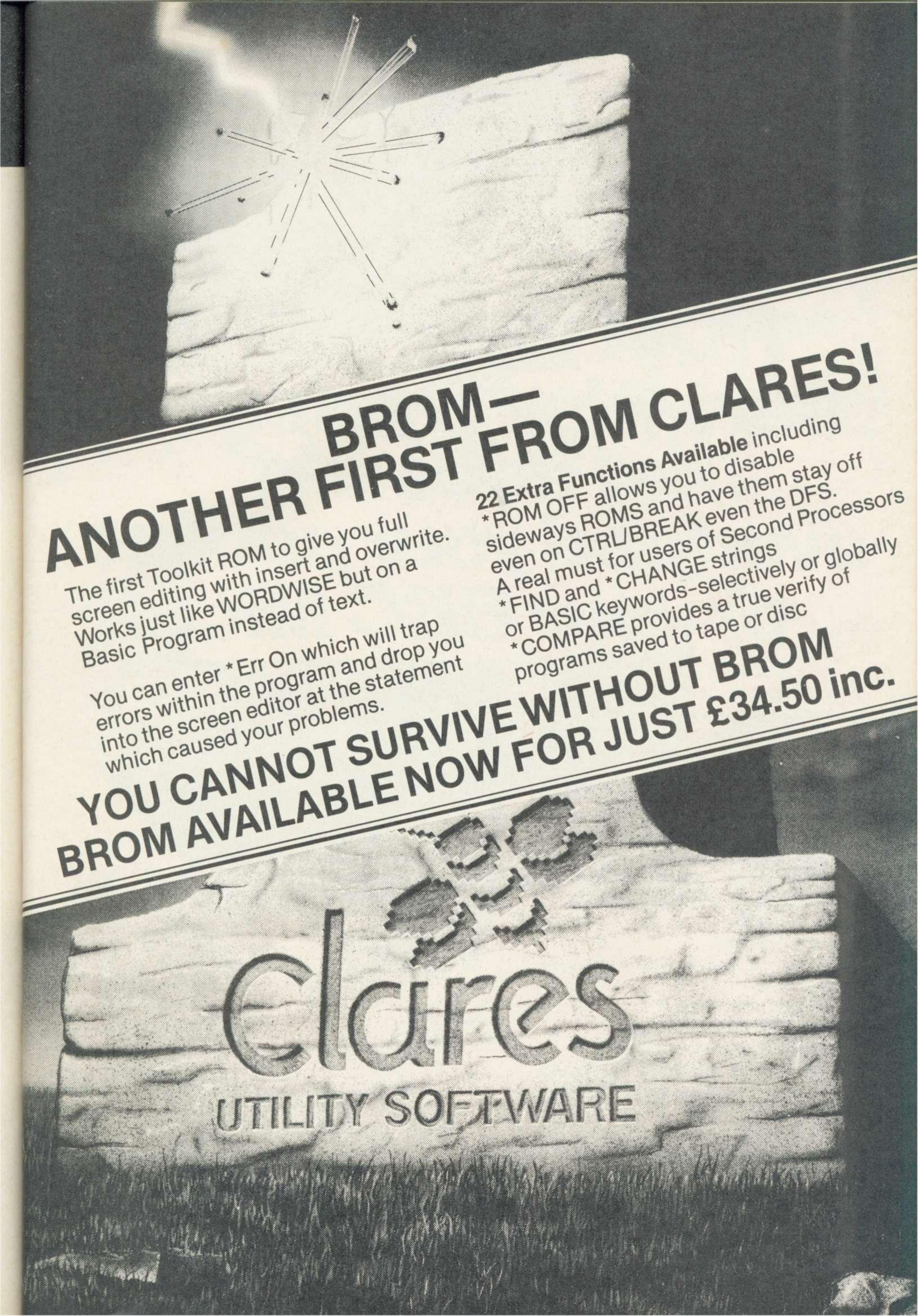
In order to simplify the task of programming the device during evaluation, I wrote a short program to allow input to be made using the allophones themselves, leaving the computer to convert them to the appropriate numbers before feeding them to the speech chip. This was a relatively straightforward exercise, and code from Cheetah's own demonstration program was incorporated (as it is intended to be) with minimal effort. I could then type in a string such as 'HH1EHLLOW' to produce the word 'hello'. Not ideal, but much better than a string of meaningless numbers. I leave it to others to take this one stage further, and write a program to generate speech from 'normal' English text (do not underestimate the enormous complexity of this task!).

As far as speech quality is concerned, the 'voice' is unmistakably synthetic, with a falsely high degree of hissy, white noise in a number of sounds. Certain allophones are particularly dubious – the 'W' for example, just doesn't seem to make the mark. Indeed, the untrained listener may be hard-pressed to distinguish many sounds that the synthesiser produces. The monotonal quality of the voice not only sounds artificial, but also becomes irritating after a while.

Cheetah's demonstration program craftily displays each phrase as the speech synthesiser generates the sounds. In a sense, this is cheating (excuse the pun), since it is much easier to 'understand' the device when you already can see what it is trying to say! A more accurate appraisal of its fidelity can be had by listening to the program (the first few times, especially) *without* looking at the screen. Most friends I tried this on were unable to make out some of the words at first.

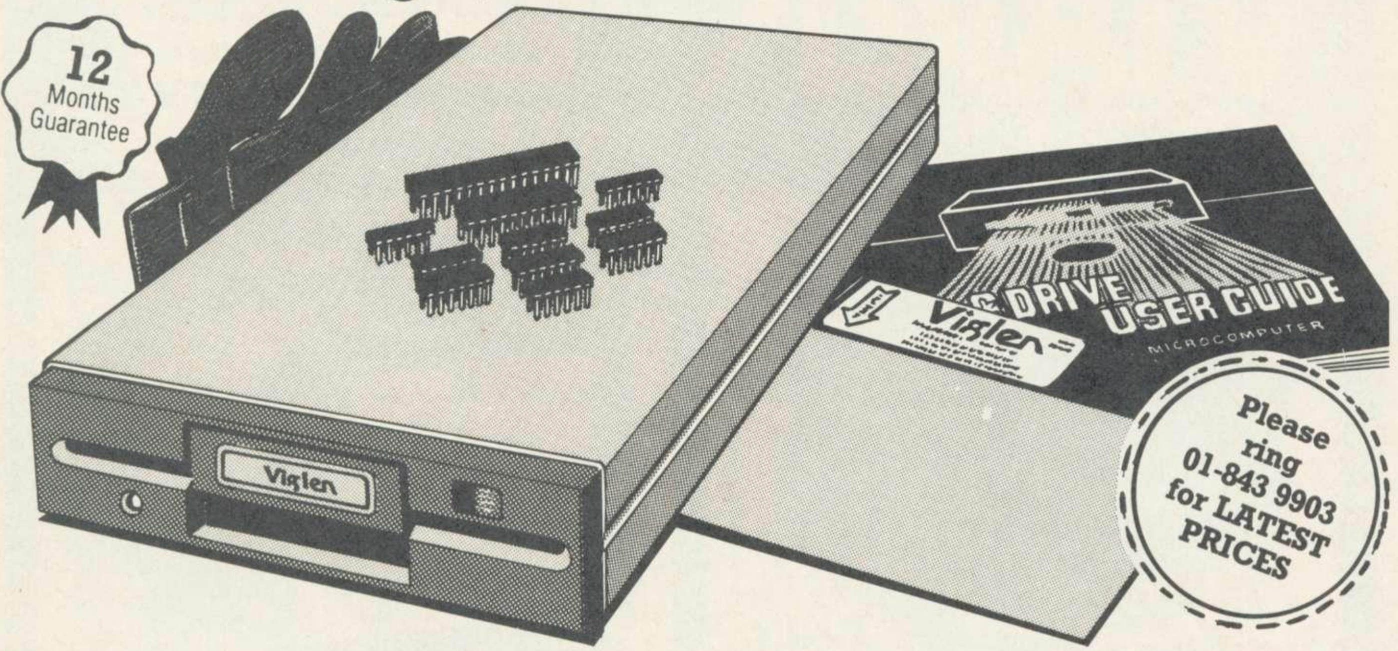
However, intelligibility does improve, not only as one becomes more used to the characteristics of its own particular 'voice', but also as one learns to program the unit more skilfully.

The *Sweet Talker* seems ideal for those wanting a low-risk introduction to speech synthesis, especially where fidelity is not of critical importance. Above all, the device is fun to use, relatively easy to program and provides considerable enjoyment at minimum cost.


BROM—
ANOTHER FIRST FROM CLARES!
The first Toolkit ROM to give you full screen editing with insert and overwrite. Works just like WORDWISE but on a Basic Program instead of text.
You can enter * Err On which will trap errors within the program and drop you into the screen editor at the statement which caused your problems.
22 Extra Functions Available including
*ROM OFF allows you to disable sideways ROMS and have them stay off even on CTRL/BREAK even the DFS.
A real must for users of Second Processors
*FIND and *CHANGE strings or BASIC keywords-selectively or globally
*COMPARE provides a true verify of programs saved to tape or disc
YOU CANNOT SURVIVE WITHOUT BROM
BROM AVAILABLE NOW FOR JUST £34.50 inc.
clares
UTILITY SOFTWARE

PURE EXCELLENCE

Best Design, Best Value, Best Service.



COMPLETE 400K 40/80 TRACK SWITCHABLE PACKAGE FROM VIGLEN

This offer includes the latest 1.2 version of Acorn Interface DNFS.

Complete Disk System for the BBC Model B

- *Package assumes you own a BBC Model B with 1.2 operating system.* with power outlet

OFFER INCLUDES THE FOLLOWING:-

- **Disk Interface** *(call in at our showroom for free fitting while you wait)* or supplied with easy-to-follow instructions.
- **400K 40/80 track double-sided disc drive** including case and all leads.
- **Comprehensive Manual** a fact-filled, 56 page document includes techniques of loading from cassette to disk. *Not available elsewhere.*
- **Utilities Disk** includes formatting, verifying, BASIC program comparator, disassembler, Epson screen dump, dual catalogue *(giving 62 files)*, large printing and many others.

UXBRIDGE ROAD
A4020
TRUMPERS WAY
BOSTON ROAD A3002
BOSTON MANOR
M4
CANAL
GREAT WEST ROAD
A4

OPEN
9.30am-6.0pm. Mon-Fri
9.30am-4.00pm. Sat.

DISC DRIVE AND DOUBLE DENSITY INTERFACE £199 inc VAT

Disc Drive on its own £129 inc VAT

DISK DRIVE & ACORN INTERFACE £229 INC. VAT

Viglen COMPUTER SUPPLIES
Unit 7, Trumpers Way,
Hanwell W7 2QA.
Telephone: 01-843 9903

AMPLE ON-THE-SPOT CAR PARKING – AND IT'S FREE!

Prices correct at time of going to press – offer subject to availability

Post to: VIGLEN COMPUTER SUPPLIES. UNIT 7. TRUMPERS WAY, HANWELL, W7 2QA.

Please send me .... add £12 carriage, usually despatched next day

I enclose Cheque/P.O. for £ .... made out to VIGLEN COMPUTER SUPPLIES.

I prefer to pay by ACCESS/BARCLAYCARD (Delete whichever is not applicable) Card No. ....

Signature ....

Name ....

Address ....

Credit cards valid if signed by card holder. Address below must be the same as card holder

AU 5/4

PHILIPS COMPUTER MONITORS

From **Viglen** COMPUTER SUPPLIES

DON'T BUY

just a colour monitor when you can have this New Philips TV + Monitor for only £225 INC. VAT



ONLY £85 INC. VAT

PHILIPS BM 7502 GREEN SCREEN MONO

From the highly successful 'Philips 80 Range', here is a monitor specially designed to display graphics and alphanumeric data with perfect clarity.

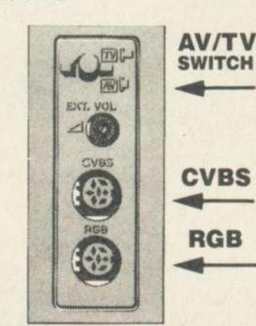
- 12″ high resolution, 20MHz band width, anti-glare screen
- Composite Video (CVBS) and Audio Input
- 2000 character (80 × 25) display
- Swivel base available £13.95 incl. VAT
- Suitable for the following computers:
  BBC B (free leads supplied for the Beeb); Apple II, IIE, II plus Apple III; Atari 600XL, 800, 800XL, 1450XL; Coleco Adam; Commodore Vic20, Vic64; IBM-PC with interface; Texas Instruments T199/4A; Timex Sinclair; Einstein; QL



PHILIPS CT 2007 COLOUR TELEVISION + MONITOR

This very popular unit is not only an excellent Colour Television Receiver, but also a sophisticated computer monitor. Featuring:

- Free lead supplied for BBC Micro
- Headphone socket and speaker mute switch
- RGB, (TTL and can be modified for linear), Composite Video Input (CVBS), Audio Input plus this model has an AV/TV switch
- 14″ picture tube with 0.65mm resolution
- Maximum 80 characters per line 20MHz band width
- 12 pre-select buttons
- Aerial supplied
- Swivel base extra £13.95 inc. VAT



AV/TV SWITCH

CVBS

RGB

Open 9.30 – 6 weekdays,
9.30 – 4 Saturdays



—Full Twelve— Months Guarantee

HOW TO ORDER

BY POST: To purchase either of the items in this advertisement simply fill in the coupon with your requirements. Enclose your Cheque/P.O. or use your Access/Barclaycard. Please make cheques payable to VIGLEN COMPUTER SUPPLIES and post to the address on the coupon Add £8.00 for Postage, Packing and Insurance for each item. Prices subject to change without notice.

BY TELEPHONE: Ring (01) 843 9903. Credit Card holders Access/Barclaycard can purchase by telephone. Please give Card No., Name, Address and the items required.

AU 5/5

Post to: VIGLEN COMPUTER SUPPLIES, UNIT 7, TRUMPERS WAY, HANWELL W7 2QA Telephone 01-843 9903. Personal callers always welcome.

Please send me ....

I enclose Cheque/P.O. for £.......... incl. £8 carriage. Payable to Viglen Computer Supplies.

I prefer to pay by ACCESS/BARCLAYCARD (Delete whichever is unapplicable).

Card No: ....

Signature: ....

Name: ....

Address: ....

....

....

The BBC Model B

All the peripherals from Viglen

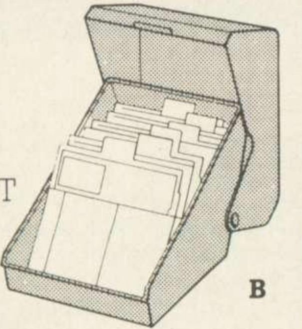
The best service-The best value

Disk Storage No.1

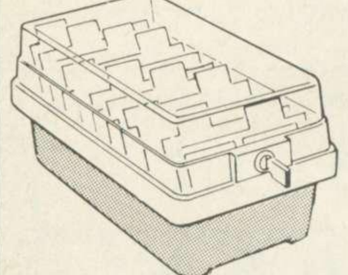
This diskette storage holds 70 diskettes

Our **Super Low** price

£14.95 including VAT



B



Disk Storage No.2

B

This lockable diskette box holds 90 diskettes

Super Low price

£14.85 inc. VAT

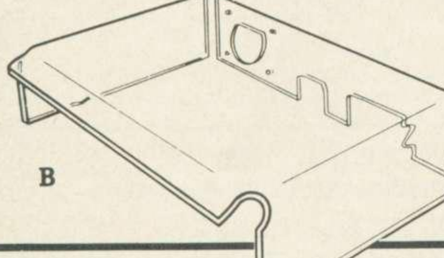
3M Scotch Disc

5¼" diskettes single sided

	1-2 boxes	3-9 boxes	10+ boxes
SS 40 TRACK	£15.00	£13.50	£13.00
DS 40 TRACK	£20.00	£18.40	£17.70
SS 80 TRACK	£23.00	£20.70	£20.00
DS 80 TRACK	£26.70	£24.00	£23.00



A



B

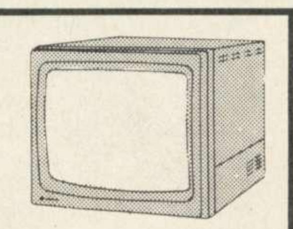
Monitor Stand

Our **Super Low** price

£14.95

inc. VAT

Microvitec Monitors



Standard **£185**
Medium **£259**
Med and Pal **£295**
High **£389**

Complete package for word processing

From **£900** inc VAT

Dot Matrix Printers

Taxan Kaga KP810 £289
Canon PW1080A £289
Epson RX80/FT £269
Epson FX80 **£389**
Shinwa CPA80 (100cps) **£219**
Mannesmann Tally MT80 **£209**

C

Daisy Wheel Printers

Juki 6100 £369
Quen Data £255

C

Please add £8 for 1½ metre length printer lead for the BBC micro.

BBC Model B £349

C

BBC Model B + DNFS (latest 1.2 DFS) £399

All prices inc. VAT
Please add for carriage.
A - £2. **B** - £3. **C** - £8.

Minimum carriage charge of £6 for all orders totalling £40 or more. These will be sent by private carrier and are insured.

Post to: VIGLEN COMPUTER SUPPLIES. UNIT 7, TRUMPERS WAY, HANWELL W7 2QA Telephone: 01-843 9903.

Please send me ____

I enclose Cheque/P.O. for £ ____ Incl. carriage.

Cheques payable to Viglen Computer Supplies.

Name ____

Address ____

Credit cards valid only if signed by card holder. Address must be the same as card holder.

VISA

I prefer to pay by ACCESS/BARCLAYCARD
(Delete whichever is not applicable)

Card No. ____

Signature ____ **AU 5/6**

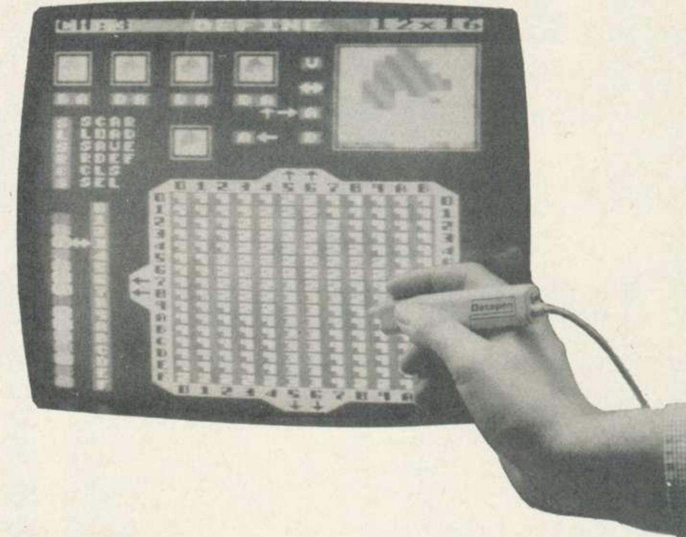
DEFINE

A MULTICOLOUR SPRITE CREATOR, EDITOR & ANIMATION CONTROLLER FOR THE BBC B COMPUTER

DEFINE is a suite of programs providing all the sprite and animation facilities needed to produce high speed arcade type games using your own multicoloured characters (sprites).

The package is extremely easy to use, every command being made with a lightpen, or joystick, directly from the screen. Real size and enlarged views of your sprites are continuously updated while you define or edit them and you may test animation sequences in the editor package as you go along. New sprites may be created by editing old versions and the number of sprites you may define is unlimited. Sprites may be any size up to 12 × 16 pixels and each pixel may have any of the 16 standard mode2 colours. The software needed to animate your sprites is provided as a separate program, which you can merge into your own BASIC, or machine code, program, allowing high resolution positioning with fast, simple commands. The number of sprites, or clones, you may have at any one time is unlimited (except by computer memory) and the speed of movement can be very fast if desired — over 400 sprites per second may be printed from BASIC, or 700 per second from machine code. Of course, you may link sprites in your own programs, producing giant sprites, or sub-animation. A 24 page handbook is supplied as well as a BASIC example program.

LIGHTPEN OR JOYSTICK CONTROLLED



DEFINE tape version	£9.95	All prices inc. VAT & Postage
DEFINE disc version	£11.95	
Datapen Lightpen Pack (optional)	£25.00	

(Software included with lightpen; introduction and 2 drawing programs)

Datapen

Datapen Microtechnology Ltd., Kingsclere Road, Overton, Hants RG25 3JB
TEL: (0256) 770488

University Software

UNISTAT

STATISTICAL PACKAGE

MULTIVARIATE REGRESSION: Main output consists of estimated coefficients, t-stats, standard errors, R^2, corrected R^2, standard error of regression, F stat, and Durbin-Watson stat. Further output options: multiple correlation matrix, var-covar matrix, ANOVA of regression, residuals, plot of residuals, interpolation. Data options: Log/ln option for each variable, no-constant regression, choice of dependent variable, selection of independent variables, auto-omission of linearly dependent variables.

ANALYSIS OF VARIANCE, SCATTER DIAGRAMS AND TIME SERIES PLOTS; One-way and two-way (without interaction) ANOVA tables, scatter diagrams of paired data and time series plots with auto-scaling.

STATISTICAL TESTS, CORRELATION COEFFICIENTS AND PROBABILITY DISTRIBUTIONS: Basic stats on each column of data (size, sum, mean, variance, std. dev.). Chi-square (contingency table), t (one sample, two sample, paired), F, Mann-Whitney U, and Wilcoxon signed rank tests. Pearson's, Spearman's rank and Kendall's rank corr. coefs. Chi-square, t, F, binomial, Poisson and normal (std., non-std.) distributions. Results of tests and corr. coefs are displayed with significance levels.

DESCRIPTIVE STATISTICS, FREQUENCY DISTRIBUTIONS AND HISTOGRAMS: Analysis of raw data or data with frequency counts. Raw data sorted and grouped. Choice of lower bounds and class intervals. Absolute, cumulative and relative frequencies. Histograms with up to 200 classes. Output displays sum, mean, mean deviation, median, variance, std. dev., 3rd and 4th moments, skewness, kurtosis, range, etc.

All programs are datafile compatible with Matrix Operations program in UNIMAX package. Data matrix capacity examples (columns by rows): **CBM-64;** 2x1250, 5x700, 10x380, **BBC-B;** 2x750, 5x400, 10x200, **48K Spectrum;** 2x1800, 5x900, 10x500. **CBM-64** (disk only): **£85, BBC-B** (disk only): **£85, BBC-B** Torch and Acorn Z80 versions: **£100, 48K Spectrum** (mdvcart, RS232 option): **£60, 48K Spectrum** (cass): **£50.**

UNIMAX

LINEAR PROGRAMMING PACKAGE

LINEAR PROGRAMMING: A powerful and instructive optimisation program capable of handling all sorts of linear programming problems (min/max, any combination of <=, =, >= constraints and $x_i>=0$, $x_i<=0$, $-\alpha<x_i<\alpha$ sign constraints). Primal, canonical, dual and their solutions are displayed in standard mathematical form. Unbounded problem and no feasible solution prompts. Edit option for all inputs. Capacity examples (variables by constraints): **CBM-64;** 10x35, 25x30, 40x25, **BBC-B;** 10x25, 20x20, **48K Spectrum;** 10x45, 25x35, 50x25.

MATRIX OPERATIONS: Inversion, transposition, determinant, pre- and post-multiplication, scalar multiplication, addition and subtraction of matrices and vectors. Any output can in turn be used as the input of the next operation without re-typing. Matrices can be saved or loaded at any stage. Datafile compatible with **UNISTAT** package. Capacities: **CBM-64;** 35x35, **BBC-B;** 25x25, **48K Spectrum;** 45x45.

CBM-64 (disk only): **£60, BBC-B** (disk only): **£60, BBC-B** Torch and Acorn Z80 versions: **£70, 48K Spectrum** (mdvcart, RS232 option): **£45 , 48K Spectrum** (cass): **£40.**

NEW FOR BBC-B, ELECTRON AND 48K SPECTRUM

INTRODUCTION TO ECONOMICS

AN INTERACTIVE COURSE IN 'A' LEVEL ECONOMICS

ECON 1: Demand measurement, elasticity, supply and demand analysis, equilibrium, the supply curve and production functions.
ECON 2: Equilibrium and disequilibrium adjustments in a market economy, exercises in market forecasting.
ECON 3: National income determination, the multiplier and convergence towards equilibrium, IS/LM analysis.
ECON 4: Money and macroeconomic adjustments, the demand for money and the rate of interest.
Available for **BBC-B** (disk/cass), **Electron** (cass), **48K Spectrum** (cass): **£40.**

To: **UNISOFT LTD,**
(Dept. U) 29 St Peter's Street, London N1 8JP. Tel: 01-359 0978
Prices include VAT and delivery within the UK. For orders from outside Europe add £5.00 per item for airmail post.



COMMODORE 64, BBC-B, 48K SPECTRUM

✻ Comprehensive user manual ✻ Full data handling facilities (display, print, change, save, load)
✻ All results can be printed out ✻

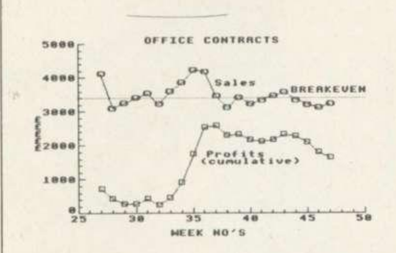


Synergy Software

'PROFESSIONAL Software for the BBC Micro'

EASIPLOT

"a very good program . . . overall rating 92% "A + B Computing
"excellent" Which? Software Guide



Easiplot is a sophisticated and user friendly BUSINESS and EDUCATIONAL graph package. Voted the 14th best educational program, Easiplot has come to be regarded as an outstanding business package and excellent value for money.
This latest version is configured for single or dual disk drives and is compatible with screendump ROM's enabling large or small graph printing.
Ideal for VIEW and WORDWISE reports.

COMPREHENSIVE FACILITIES INCLUDE:
★Line, Bar, Pie, Scatter and Data charts
★5 line or bar merging
★Bar/Line conversion option
★Auto or manual scaling
★Comprehensive label and edit facilities
★Screendumps for Epson compatible printers
★Save/Load options on single or dual drives
★Provides easy access to screendump ROM's
★Grid and screensave facilities
★56 page USER MANUAL
ONLY £24.95

BIOGRAM

BIOGRAM is a new concept in computer software

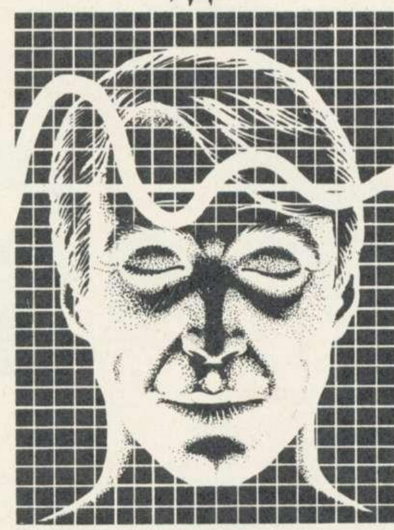
For less than the cost of most ROM software the BIOGRAM SYSTEM provides you with the tools to control your state of relaxation and response to stress.

BIOGRAM uses proven biofeedback techniques to provide you with audio/visual impressions of your physiological and psychological state.

Your stress level is detected by two electrodes and is converted and relayed to the computer by the electronic BIO-MODULE. The BIOGRAM software translates this signal into a form that will enable the user to learn to influence his own state of mind.

BIOGRAM is FUN and EASY to use, just plug in the module, attach the electrodes and choose your program. Ready to run in seconds.





The BIOGRAM system comprises an electronic bio-module fitted with plugs and electrodes and a suite of programs on disk or cassette.

The BIOGRAM software package includes:

★RELAXOGRAM – a multi-level relaxation trainer and progress tester.

★LIE DETECTOR – a graphical lie detector with an automatic interrogation facility.

★P.REDUCER – a programmable phobia identifier and reducer.

The comprehensive user Manual provides many examples of biofeedback applications and experiments to try.

HARNESS THE POWER OF BIOFEEDBACK – LEARN TO CONTROL YOUR FEARS, PHOBIAS and STATE of TENSION. AN INVESTMENT FOR THE WHOLE FAMILY AT £37.95

SHARE ANALYSER

'an excellent program' *Micro User* – Jan 85
'an invaluable aid' *Northern Echo*
'very highly recommended' *Which? Software Guide*
'Excellent investment' *Luton News*

Share Analyser is a comprehensive reporting, analysis and charting package for the BBC Micro. Transaction and share price databases are built up for each share name and a variety of report and analysis facilities can be instantly accessed. Reports can be produced on any printer. Share Analyser is easy to use and is supplied with a comprehensive Operating Manual.

FACILITIES INCLUDE:
★Up to 20 share names per portfolio per disk
★Use as many disks as you require
★Capacity per disk – 20,000 whole number share prices and 320 purchase/sale/dividend records
★Reports include Valuation, Profit Statements, Movement Analysis, Transaction Reports etc
★Graphics facilities include Moving Averages, Rise and Fall, Superimpose, Magnification, Grid, Screenwrite, Screendump etc
★Adjusts for scrip issues etc
★Provides access to screendump ROM's
EXCELLENT VALUE at £24.95 – ask for full details.



All Easiplot and Share Analyser specifications are for the disk version. FULL DETAILS OF ALL OUR PRODUCTS ARE AVAILABLE ON REQUEST.

Prices include p + p etc – no extras	PRICE
Biogram (cassette or disk). .BBC B only	£37.95
Easiplot 1 (cassette). .BBC B & Electron	£15.95
Easiplot 3 (including Dataplotter – disk)	£24.95
Share Analyser (cassette). .BBC B & Electron	£17.95
Share Analyser (disk). .BBC B only	£24.95

Disk orders. .state 40 or 80 track (add £3 for overseas orders).
Write or phone for further details (0582) 33858 (Ansaphone Service).
ALL PROGRAMS ARE NORMALLY DESPATCHED BY FIRST CLASS POST WITHIN 24 HOURS AND ARE GUARANTEED FOR 12 MONTHS. Available MAIL ORDER only.

Send cheque/PO etc to Synergy Software 7, St Andrews Close, Slip End, Luton, LU1 4DE.

CHASE DATA

NEW

PRODUCT LAUNCH

SPECIFICALLY ENHANCED FOR USE WITH THE BBC MICRO.

Canon 221A "Super-Slim" (33.5mm) 80 track double sided 400K floppy disc drive (40/80 track switching).

Continuing our policy of securing premium quality products at budget prices we are pleased to announce the new generation Canon 221A drive.

Specifications:
80 track double sided disc drive. 40/80 track switching with dual colour LED. Capacity 400K in single density, operates in double density. Direct drive, track to track access 3 ms in 96 TPI mode. Dimensions:– 1/3 standard height, only 33.5mm.

£154 INC.

All canon 40/80 switchable disc drives feature an on-board dual-colour LED on the front panel to show track mode selected. This is coupled with our own unique two-stage illumination. To give a clear operating status, as follows.

40 TRACK MODE:	LED GREEN
80 TRACK MODE:	LED RED
POWER ON:	HALF-ILLUMINATION *(GREEN OR RED)*
DRIVE SELECTED:	FULL-ILLUMINATION *(GREEN OR RED)*

SPECIAL OFFER

WHILE STOCKS LAST

£95 INC.

**CANON 210 2/3 HEIGHT (57.5 mm)
40 TRACK D/SIDED 200K
FLOPPY DISC DRIVE
DIRECT DRIVE**

Specifications:
40 track double sided disc drive
capacity 200k in single density
Operates in double density
Track to track access time – 6 ms
Full 12 month warranty with optional extended warranty available

Price Includes:
Drive cased with cables, manual & utilities disc and includes VAT, postage & packing.

FUJI FLOPPY DISCS

	Per box 10	If purchased with disc drive
40 TK SS DD	**£17.60**	**£15.60**
40 TK DS DD	**£24.50**	**£22.50**
80 TK DS DD	**£28.60**	**£26.60**

These prices include VAT & P & P.



NEW SOFTWARE RELEASE FROM CHASE DATA

Vector 1 –

The ultimate tape to disk utility

Vector 1 allows you to transfer almost all your tape software to disk. Unlike others, you only need to buy 1 copy of Vector 1 since it transfers tapes to specially formatted program discs. This is easily the most powerful tape to disk utility available.

Vector 2 –

Disk to disk utility

Vector 2 allows you to make backup copies of all your valuable disk software. It is the most advanced utility of its kind available. It is a condition of sale that neither of these products are used for infringement of copyright.

Not compatible with double density interface.

Vector 1 £16 On its own
£15 If purchased with disk drive
Vector 2 £16 On its own
£15 If purchased with disk drive



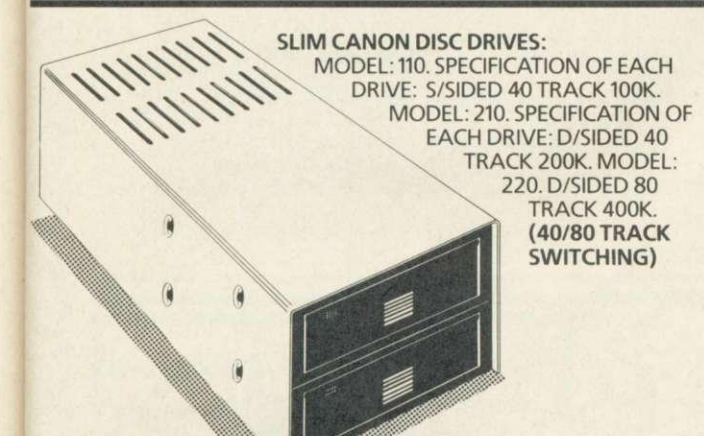
DISCUS

Test utility for testing your own disc drive, at regular intervals to avoid the dreaded flop of your floppy. Menu driven, easy to use, 40 or 80 track versions.

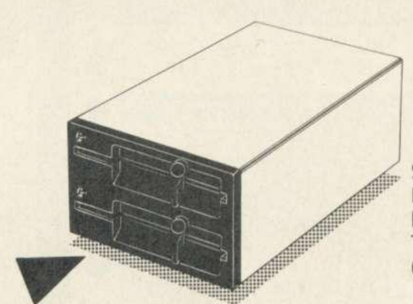
Tests: Motor speed, read/write, steptest, alignment test*, step & read/write test, read only test.

£8.00 inc. **£7.00** if purchased with disc drive.

*This test requires and oscilloscope & alignment disc.



SLIM CANON DISC DRIVES: MODEL: 110. SPECIFICATION OF EACH DRIVE: S/SIDED 40 TRACK 100K. MODEL: 210. SPECIFICATION OF EACH DRIVE: D/SIDED 40 TRACK 200K. MODEL: 220. D/SIDED 80 TRACK 400K. **(40/80 TRACK SWITCHING)**



SLIM SANYO DISC DRIVES: MODEL: 596D. SPECIFICATION OF EACH DRIVE: D/SIDED 40/80 TRACK 400K. **(40/80 TRACK SWITCHING)**

The Sanyo disc drive is a "half-height" 40/80 track switchable unit of standard dimensions, built to Sanyo's usual high standards of quality and reliability.

All inclusive price list: This means: disc drive + case + all power & data cables + UK carriage + utilities disc & manual + VAT.

	CANON					SANYO
Model	**110**	~~**6108**~~	**210**	**220**	**221A**	**596D**
Formatted Capacity per drive on BBC Micro:	100K	~~200K~~	200K	400K	400K	**400K**
Single Drive & Case:	£85	~~£75~~	£95	£149	£154	**£149**
Single Drive & Case PSU:	£110	–	£120	£174	£179	**£174**
Dual Drive & Case:	£174	–	£191	£279	£289	**£279**
Dual Drive & Case/PSU:	£204	–	£226	£309	£319	**£309**

DON'T FORGET YOUR VECTOR 1 & 2 WHEN ORDERING.

Support:

Warranty: All disc drives sold by Chase Data Ltd come with a full one-year warranty on parts & labour with optional extended warranty on all drives.

Extended Warranty
Your Insurance of trouble free operation
When ordering your disc drive, ask about our second and third year extended warranty scheme. This covers ALL PARTS AND LABOUR and costs from as little as £15.00 on single drives and £23.00 on dual drives.

Non-Warranty Service: As the experts in our field, we can offer service on most makes of floppy disc drive.

Recalibration & Alignment . . . **£25** per unit inc. VAT (parts extra).

Phone for details: **(Tel: 0784-38487).**

Payment: BARCLAYCARD VISA

By Post: Send your remittance (cheques only please) with your order to:



Unit 2, Crabtree Road, Thorpe Industrial Estate, Egham, Surrey, TW20 8RN.

By Phone: **(Tel: 0784-38487).** Allow up to 21 days for delivery.

R.S.D. CONNECTIONS

CONNECTORS IDC

	Card Edge	(Transition) PCB	2 Row Socket
10-way	£1.20	£0.85	£0.80
14-way	–	–	£0.90
16-way	£1.60	£1.20	£1.00
20-way	£1.90	£1.35	£1.20
26-way	£2.40	£1.60	£1.45
34-way	£3.10	£1.95	£1.60
40-way	£3.40	£2.00	£1.85
50-way	£3.85	£2.25	£2.00
60-way	£4.80	£2.60	£2.25

IDC SHROUDED HEADERS WITH EJECTING LOCKING ARMS

	Straight	Right Angle
10-way	.85	.90
14-way	£1.00	£1.20
16-way	£1.25	£1.45
20-way	£1.40	£1.60
26-way	£1.70	£1.95
34-way	£2.00	£2.30
40-way	£2.15	£2.45
50-way	£2.30	£2.65
60-way	£2.45	£2.85

IDC D CONNECTORS

	Male	Female
9-way	£2.70	£3.20
15-way	£3.20	£3.70
25-way	£3.80	£4.45
37-way	£5.90	£6.80

IDC AMPHENOL

(Centronics)

36-way plug	£4.95
36-way socket	£5.95

PRINTER LEADS

ALL 1 METRE LENGTH

BBC	£9.95
BBC serial	£8.95
AMSTRAD	£16.75
MEMOTECH	£12.75
EINSTEIN	£12.75
IBM PCC	£15.95
SPECTRUM interface 1 to RS 232	£9.75
SPECTRUm interface 1 to Centronics	£10.75
CENTRONICS to Centronics	£15.20
DRAGON	£9.95
QL	£10.75

COMPUTER LEADS

Dual disk drive 1m	£10.25
Single disk drive 1m	£7.25
7 pin DIN plug to 2x3.5mm 1x2.5m Jack plugs	£2.25
5 Pin DIN plug to 2x35mm 1x2.5mm Jack plugs	£2.20
6 Pin DIN Plug to 6 Pin DIN Plug	£1.95
2x3.5mm Jack plugs to 2x3.5mm Jack plugs to	£1.25
7 Pin DIN plug to 5 pin DIN plug	£1.95
7 Pin DIN Plug to 3 pin DIN plug and 2.5mm Jack plug	£2.25
7 Pin DIN plug to 7 Pin DIN plug	£2.25
5 Pin Domino Plug to 5 pin Domino plug	£1.95
Phono Plug to Coaxial TV Aerial plug	95p

D CONNECTORS

Solder Bucket	Male	Female
9-way	.75	£1.00
15-way	.95	£1.50
25-way	£1.50	£1.90
37-way	£2.40	£3.25

HOODS .95

RIBBON CABLE (Price per ft)

	Grey	Rainbow
9-way	.13	.24
10-way	.15	.28
14-way	.18	.32
15-way	.20	.36
16-way	.22	.40
20-way	.30	.50
24-way	.36	.60
25-way	.40	.65
26-way	.45	.70
34-way	.60	.80
37-way	.65	.85
50-way	.70	.90
50-way	.95	£1.25
60-way	£1.10	£1.40
64-way	£1.15	£1.50

DIP HEADERS

Pins	
14	90p
16	£1.00
24	£1.40
28	£3.95
40	£2.15

BBC MONITOR STAND

Heavy-duty stand
Vinyl covered in BBC, covers to match
ONLY **£12.95** + £2.30 p&p

EDGE CONNECTORS

2x23-way (ZX81)	£1.85
2x28-way (Spectrum)	£2.10
2x6-way VIC20/64	£1.20
2x12-way	£1.60

DOUBLE SIDED PLUG BOARDS

ZX81 23-way	£1.25
Spectrum 28-way	£1.50

BBC JOYSTICK
DELUXE JOYSTICK for BBC MICRO.
Fits directly into BBC Micro analogue port
£12.95

TELEPHONE CONNS

Surface master jack socket	£3.75
Surface extn socket	£2.50
Dual outlet adaptor	£4.25
Line jack cord 3mtr	£1.85
BT jack plug	48p
4 core cable per metre	15p

All surface units shuttered BT approved.

MONITOR LEADS

BBC 6-pin to start plug	£4.95
BNC plug to phono plug	£2.95
QL to colour monitor	£4.95
QL to mono monitor	£1.25

SPECTRUM EXTENSION LEADS

6 inch extension calbe M to F	£10.50
6 inch M to 2 F's	£14.75
12 inch extension cable M to F	£10.75

Other convigurations made to order
Write or phone for quote

CUSTOM ASSEMBLIES

ANY COMBINATION OF IDC & RIBBON CABLE LEADS MADE TO ORDER

TRADE ENQUIRIES WELCOME

Please add 15% VAT *Free p&p C.W.O. or use*

R.S.D. CONNECTIONS LTD. Dept AU5
P.O. Box 1, Ware, Herts. Telephone (0920) 5285
Formerly trading as Computer Link U.K

BASIC COMPILER

Turns your basic programs into really fast machine code. The compiler is very easy to use, and comes complete with full instructions.

For the BBC model B, or Model A with 32k.

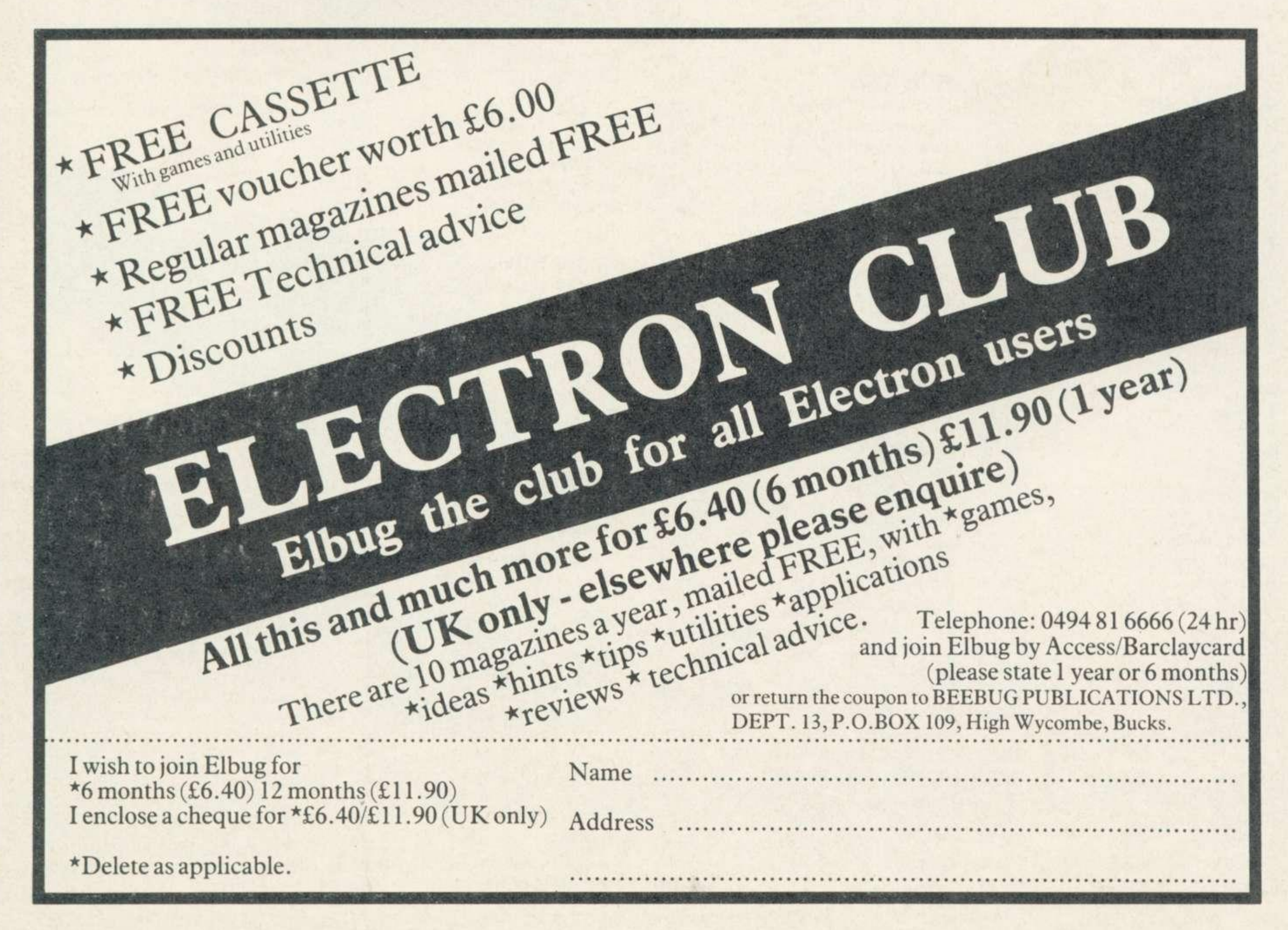
Cassette	**£26.95**
Disk	**£28.95**

(40 OR 80 TRACK)

Cheque/P.O. or SAE for details to

ACK Data
Dept Au
21 Salcombe Drive, Redhill,
Nottingham, NG5 8JF
Tel. (0602) 262498

NOW SUPPORTS OVER 100 KEY WORDS



Twillstar reliability for Home

COMPUTERS

BBC

BBC Model B	£345.00
BBC Model B + Disc Interface	£399.00
BBC Model B + Econet Interface	£385.00
BBC Model B + Disc & Econet Interface	£458.00
Z80 Second Processor	£399.00
6502 Second Processor	£199.00
Acorn Bistick	£375.00
Acorn IEE Interface	£325.00
BBC Prestel Receiver	£132.00
BBC Telex Receiver	£225.00
Speech Interface	£54.00
Acorn 10M hard disc	£1495.00
Acorn 30M hard disc	£2299.00
Acorn Fileserver level 3	£345.00
Acorn Music 500	£199.00

ELECTRON

Electron	£129.00
Electron Me + My Micro Pack	£229.00
Plus 1 Interface	£59.95
Plus 3 Interface (DFS/Drivew)	£225.00

TORCH

Torch Z80 Card + Software	£315.00
Torch Z80 Card + Software + Disc Pack	£745.00
Torch UNICORN Z80 system	£745.00

BBC FIRMWARE

View Word Processor	£55.00
Word Wise Word Processor	£37.00
Word Wise + ROM	£49.00
Viewsheet	£55.00
Speech Synthesiser	£54.00
Graphics ROM	£32.00
Disc Doctor	£32.00
Print Master	£32.00
Communicator	£65.00
Acorn 1.2 O/S	£11.50
Acorn Basic II	£25.50
Termi Emulator	£32.00
Gremlin Debug ROM	£32.00
Caretaker	£32.00
Toolstar	£33.00
Commstar	£33.00
BCPL ROM	£99.00
System ADE ROM	£60.00
System SPY ROM	£30.00
Edword User Pack	£44.00
Edword Teacher Pack	£25.00
Merlin Scribe	£59.00
ExMon (Beebug)	£27.00
Toolkit (Beebug)	£27.00
Mu-ROM (Beebug)	£27.00
Gemini Datagem database	£115.00
BBC UltraCalc	£69.00
BBC Toolbox	£20.00
BCPL ROM + Discs + Manuals	£95.00
Logo	£69.00
Iso-Pascal	£69.00
Beebug Help ROM	£25.00
Beebug Sleuth	£29.00
Spellcheck II	£31.00
DNFS ROM	£20.00
B ROM	£32.00

EXPANSION BOARDS

Raven 20 (upgrade BBC to 52K computer)	£69.95
RAM-AMP 6 socket + 16K RAM	£56.00
6 Eprom socket + 32K RAM	£67.00
IX16K RAM Board	£38.00
Eprom Programmer (Blow all your BBC Eproms)	£49.00

BBC UPGRADES

A-B upgrade	£110.00
DFS Interface	£99.00
Econet Interface	£69.00
Speech Interface	£54.00

DISC UTILITIES

View Index	£14.95
View Printer Driver generator	£11.50
Hi-View	£59.00
Acornsoft Database	£15.00
Clares Betabase 40/80	£23.00
Clares Graphdisk 40/80	£12.95
Clares Replica II Disc Copier 40/80	£11.95
Clares The Key 40/80	£12.95
Beebugsoft Masterfile	£19.00
Beebugsoft Design	£19.00
Microtext (cassette)	£49.80
(disc)	£59.85
BCPL Calculation Package	£19.00
Masterfile II	£32.00

MONITORS

Microvitec 1431 Standard Res	£189.00
Microvitec 1451 Medium Res	£289.00
Microvitec 1441 High Res	£399.00
Microvitec 2031 20" Standard Res	£315.00
Microvitec Sinclair QL	£270.00
Philips BM7502 V.H. Res (Green)	£85.00
Normende TV/Monitor + Remote Control	£249.00
Philips CTV + RGB	£229.00
Kaga RGB Vision III 12"	£355.00
Kaga 12" H.R. Green	£118.00
Sanyo SCM 14" VHR	£425.00
Novex 1414 colour Monitor	£215.00
Philips V7001 H.R. (Green) with volume, RGB, Composite Inputs	£75.00

DISC DRIVES

BBC Single 100K Drive	£99.00
BBC Dual 200K	£189.00
BBC Single 200K 40 Track	£159.00
BBC Dual 400K 40 Track	£299.00
BBC Single 400K 80 Track	£159.00
BBC Dual 800K 80 Track	£318.00
BBC Single Power Supply	£20.00
BBC Dual Power Supply	£29.00

Cumana Drives

CSX 100 40T/600K single	£109.00
CSX 200 80T/200K single	£149.00
CSX 400 80T/400K single	£179.00
CS 100 40T/100K single (PSU)	£149.00
CS 200 80T/200K single (PSU)	£189.00
CS 400 80T/400K single (PSU)	£199.00
CD 200 40T/200K dual (PSU)	£269.00
CD 400 80T/400K dual (PSU)	£315.00
CD 400/S 40/80T switched dual (PSU)	£399.00

PRINTERS

Brother EP44	£228.00
Brother HR5	£148.00
Brother M1009	£195.00
Canon PW1080A 160 CPS (NLQ)	£289.00
Canon PW1156A 160 CPS (NLQ)	£399.00
Kaga KP810 (NLQ)	£279.00
Kaga KP910 (NLQ)	£399.00
Kaga RS232 + 2K buffer	£95.00
Ensign 1650 165 CPS	£305.00
Epson RX80T 100 CPS	£212.60
Epson RX80F/T 100 CPS	£240.00
MPO-165 (NLQ)	£299.00
Panasonic KP1091	£325.00
Seikosha GP100A	£189.00
Epson RX100F/T 100 CPS	£396.00
Epson FX80 160 CPS	£365.00
Epson FX100F/T 160 CPS	£494.00
Shinwa CP80A	£199.00
Riteman Compact 120 CPS	£199.00
Star Gemini 10X 120 CPS	£230.00
Star Gemini 15X 120 CPS	£339.00
Epson 8143RS232 Interface for FX & RX	£34.00
Epson 814RS232 Interface with 2K Buffer X On/Off	£65.00

DAISYWHEEL PRINTERS

Brother HR15	£378.00
Brother HR15 Keyboard	£155.00
Brother HR15 Sheet Feeder	£212.00
Brother HR15 Tractor Feed	£95.00
Quen Data 20 CPS	£249.00
Juki 6100 18 CPS	£340.00
Juki 2200 Daisywheel/Typewriter	£280.00
Juki Single Sheet Feeder	£230.00
Juki tractor Unit	£115.00
Juki RS232 Interface	£74.00
Juki Spare Daisywheel	£16.00

COLOUR PRINTERS

Canon PJ1080A 7 Colour 40 CPS Ink Jet	£440.00
Seikosha GP700A 7 Colour 50 CPS	£399.00

Plotters

Penman Plotter	£275.00
PIXY Plotter	£399.00
Epson HF-80	£445.00

Add Ons

AMX Mouse	£79.00
Trackerball	£59.00

DISKS

Very high quality 3M Diskettes, guaranteed for life at only £20.00 per box (Double-sided 80 track)

MODEMS

Pace Nightingale	£135.00
(inc Comstar ROM)	£155.00

WS2000

A world standard modem switchable between 75, 300/300, 600,1200/75, 75/1200 baud rate. This is the only modem you would ever likely to need to communication with any computer throughout the world.

Modem	£148.00
Lead	£7.50
Auto-Dial	£34.00
Auto-Dial Cable	£4.50
Auto-Answer Card	£34.00
SK1	£11.50
DS1	£11.50

Telemod 3

BT approved – switchable between 75, 300/300, 1200/75, 75/1200 and allows you to communicate virtually anywhere in the world. it will allow you to communicate with services like Micronet, Telecom Gold, Prestel, One-to-One, Easylink, Microweb. It comes as a standard with built in board for auto-answer.

Modem	£155.00
Lead	£8.00
Software	£19.95

BBC BUSINESS SOFTWARE

Microsimplex	£270.00
Gemini Integrated Accounts	£99.00
Sage Accounts	£429.00

Please add £4.00 for Disc Version

ACORNSOFT

Invoicing · Order Processing
Mailing List · Purchasing
Stock Control · Accounts Payable
Accounts Receivable
Price £23.95 each

WORD PROCESSING

BBC 1

BBC Mod. B, View of Wordwise, High Res. Monitor, Quen Data daisywheel printer, Cassette recorder with 10 cassettes and all the necessary cables and printer paper.
£750.00

BBC 2

BBC Mod. B + DFS, View or Wordwise, 100K BBC drive, High Res Monitor, QuenData daisywheel printer, 10 diskettes and all the necessary cables and paper
£843.00

BBC 3

Same as BBC 2 but with 400K drive £929.00

BBC 4

BBC Mod. B + DFS, View or Wordwise, 800K Dual Disc Drive, High Res. Monitor, Juki 6100 daisywheel printer, 10 of 80 track Diskettes and all the necessary cables and printer paper£1,244.00

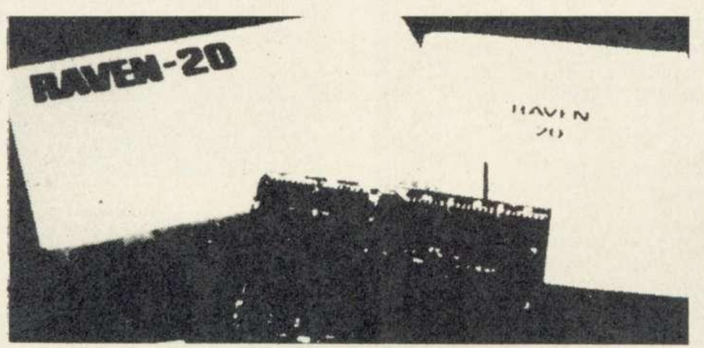
#and Business computer users

ACCESSORIES

BBC Data Recorder	£35.00
DR6 Data Recorder	£25.00
Tornado Joysticks SW self-cen PR	£13.95
Quickshot + I/F for BBC	£19.95
Sureshot Joystick	£18.00
BBC Dust cover	£3.50
RH Light Pen	£44.00
Graph Pad	£99.00
BB Key Function key mask	£1.90
Disc storage box (15)	£6.95
Disc storage box (80)	£14.50
Printer dust cover	£4.95
Monitor dust cover	£4.50
Listing Paper 9.5" x 11" (2,000 sheets)	£15.00
Data Cassette C15	£0.40
Anti glare Monitor Safety Screen	£17.50

LEADS

Cassette leads	£3.00
5 pin DIN to 6 pin DIN (RGB)	£3.00
Monochrome monitor lead	£3.25
Disc Drive power leads to BBC (single)	£4.50
(dual)	£5.00
Disc Drive Ribbon Cable (Single)	£8.00
(dual)	£10.00
6 pin Din to 6 pin Din (RGB) Monitor lead	£3.00
BNC to phono lead for (composite) Monitor	£3.00



▲

EXPANSION BOARDS

RAVEN-20 BOARD

The RAVEN-20 is a 20K RAM EXPANSION for the BBC Micro, Model B, fitted with O.S. 1.2.

This specially designed product plugs in to the CPU socket of your micro (centre socket of the 3 available) with the minimum of effort. The pins are specially custom made, thus avoiding any possible damage to the circuity.

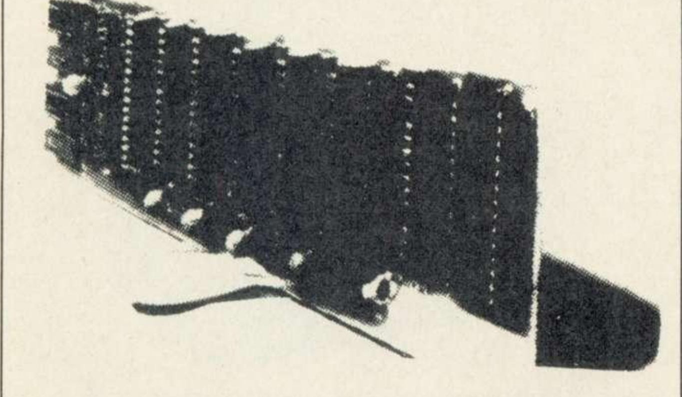
The RAVEN board provides the user with an extra 20K of usable RAM in screen modes 0 to 3. This together with the aid of software makes the system completely transparent to both the user and the computer.

The RAVEN-20 software ROM gives much more than just the standard commands, it has been programmed to give more and better commands! Here are some of the commands:

RON – Enable RAVEN-20 in SLOW Mode
FRON – Enable RAVEN-20 in FAST Mode
RVFF – Disable RAVEN-20
RTEST – TEST RAVEN-20 RAM
RSTAT – Show status of RAVEN-20
SSAVE – Save Screen to file
RAM – Sideways RAM load
RZAP – Examine/Alter BBC RAM
RVZAP – Examine/Alter RAVEN-20 RAM
RPAGE – Set/Show RAVEN-20 work page (fast mode)

Price £69.95 inc of VAT





◀ **RAM-ROM BOARD**

The RAM-ROM extension board gives an extra 6 sockets for extra ROM's and 2 slots of RAM. This RAM is not an extension of BASIC. It is intended that the RAM be used to develop your own ROM based software. There are in fact seven sockets on the board, the 7th replaces the socket on the main board that would otherwise be taken by the ROM board. (The RAM-ROM board can accommodate both 2764 type EPROMS as well as 27128 EPROMS and ROM).

RAMAMP board is a best of its kind on the market Comes complete with either 16K RAM or 32K RAM. Doesn't need any soldering. Anyone can install in matter of a minute. Comes complete with 10 utility programs to make full use of the Board, and it's fully compatible with RAVEN-20 Board.

Are you surprised how we have sold over 2000? (Read Acorn Review March '85).

RIBBONS

MX100/FX100	£11.50
MX/FX80	£5.50
GP80	£5.00
GP100	£5.70
GP250	£6.00
KAGA KP870	£8.50
Canon PW1080	£8.50
Brother HR15 M/S	£5.50
Brother HR15 Carbon	£4.30
Juki 6100	£4.20
Oki 80/82	£2.35
Riteman	£6.50

DISC STORAGE

10 x 5¼ library case	£2.00
15 x 5¼ flip n file	£6.95
40 x 5¼ Lockable	£14.50
80 x 5¼ Lockable	£14.50
Disc Albums stores up to 20	£9.95

LISTING PAPER

11" x 9½ 2000	£15.00
Teleprinter Roll	£4.50

PRINTER LABELS

1000 90 x 36mm	£5.70
1000 90 x 49mm	£8.900
1000 102 x 36mm	£7.15

EPROMS

2764 – 250ns	£4.95
27128 – 250ns	£11.50

TOP 10

1	Elite	£14.95 (£16.95)
2	Frak	£7.50
3	Blockbusters	£7.95
4	Sabre Wulf	£9.95
5	3D Grand Prix	£7.95
6	Scrabble	£12.95
7	Pole Position	£9.99
8	Football Manager	£7.95
9	Castle Quest	£12.95 (£14.95)
10	Music System	£24.95

All prices inclusive of VAT. Please add £1.50 for P&P.

HOW TO ORDER

You may purchase any of the items listed by cheque made payable to: Twillstar Computers Ltd. Barclaycard or Access. All you have to do is fill in your requirements on a separate sheet of paper, post to us and we will despatch with 24 hours, subject to availability. All prices inclusive of 15% VAT. ADD £2.50 P&P for orders below £150. Over add £8 P&P. Credit card holders may order by telephone. Give card number, name, address and items required. Please note VAT is not charged on export orders. Export customers please ring for details of P&P.





TELEPHONE ORDERS
(01) 574 5271

Open 6 days a week 9am to 7pm Monday to Saturday



Twillstar Computers Limited

17 Regina Road, Southall, MIDDLESEX, UB2 5PL. TEL: (01) 574 5271



LONDON

London. Association of London Computer Clubs: Robin Bradbeer, Polytechnic of North London, Holloway, London N7 8DB
London. Association of Computer Clubs: Rupert Steele, 17 Lawrie Park Crescent, London SE26 6HH
London. Radio Amateur Micro User Group (G4KCS): The Secretary, c/o R.A. Webb, 39 Aldworth Road, Stratford, London E15 4DN
London. Wandsworth Computer Club: C. Verrier, Earlsfield Library, Magdalen Road, London SW11
East London. SOBAT Computer Club (East London): Mr T. A. Kayani, 12 Calderon Road, London E11 4EU. Tel: 01-556 5423
North London. BBC Micro Users Group: Mr Ric Keyworth, 'The Penthouse', 4b Kilburn High Road, London NW6 5UL. Tel: 01-734 9235, (7am-3pm Mon-Fri)
North London. 6502 North London User Group: Jim Chambers, Dept. of Psychology, University College, 26 Bedford Way, London WC1. Tel: 01-387 7050 Ext 413

SOUTH-EAST

Bognor Regis. Bognor Computer Group (BUG): E. R. Piper, 2 Ely Gardens, Aldwick Park, Bognor Regis, Sussex PO21 3RY
Bottisham. BAUG: (Bottisham Acorn User Group), G. F. Wilcockson, 19 Gallows Hill, Saffron Walden, Essex CB11 4DA. Tel: 23793
Bracknell. Bracknell Primary Schools Computer Users' Group: D. Donaldson, Secretary, Wildridings County Junior School, Netherton, Bracknell, Berks RG12 4DX
Brighton, Hove & District. Brighton, Hove & District Computer Club: J Smith, Secretary, 30 Leicester Villas, Hove, E. Sussex BN3 5SQ
Bucks. Chiltern BBC Micro User Group: Colin Mills, 70 Chestnut Lane, Amersham on the Hill, Bucks HP6 6EH. Tel: Amersham 6103
Caterham. Computer Club: Caterham Leisure Centre, Godstone Road, Caterham, Surrey CR3 6RE. Tel: Caterham 48304/43316
Harpenden. Microcomputer Group: R. Welch, 7 Tylers, Harpenden, Herts AL5 5RT
Harrow. Harrow Computer Group: Bazyle Butcher, 16 St. Peter's Close, Bushey Heath, Watford WD2 3LG. Tel: 01-950 7068
Ilford. ILBUG: Peter Jones, 1 de Vere Gardens, Cranbrook, Ilford, Essex IG1 3EB. Tel: 01-554 9825
Iver. Iver Computer Society (IC's): John Haigh, 11 Colliston Walk, Fords Farm, Calcot, Reading, Berks RG3 5ZJ. Tel: 0734-417534
Kent. CP/M User Group: 72 Mill Road, Hawley, Dartford, Kent
Milton Keynes. BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes. Tel (0908) 564271
North & Mid Essex. User Group (NAMEBUG): Andy Purkiss, 12 Palm Close, Witham, Essex. Tel 0376 515609. Prestel: 376515609
South East Essex. BBC User Group (SEEBUG): Miss J. Lines, 97 Oakhurst Drive, Wickford, Essex SS12 0NW. Tel: 03744 63396
Sutton. Sutton Library Computer Club: The Secretary, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR. Tel: 01-642 3102
Welling. Computer Users Club: Tony Latham, 69 Hadlow Road, Welling, Kent DA16 1AX

SOUTH & SOUTH-WEST

Alton. Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW. Tel: Alton 87478
Bristol. Format 40/80 Club: BBC Disc User Group, Peter Hughes, 5 Marsh Street, Bristol BS1 4AA
Fareham. Porchester & Fareham Computer Club: Simon Ward, 9a East Cams Close, Downend, Fareham, Hants PO16 8RP
Gosport. BOGBUG: Borough of Gosport BBC Users Group, Graham Dubber, 128 Wych Lane, Gosport, Hants PO13 0TE. Tel: (0329) 282221 (evenings)

MIDLANDS & ANGLIA

Boston. Boston Acorn Computer Users Club: J. C. Goodwin, 245 Church Green Road, Fishloft, Boston, Lincs PE21 0RP
Burton-on-Trent. Beeb Users' Group (Bug Club): Linda Yeomans, 13 Regent Street, Church Gresley, Burton-on-Trent, Staffs DE11 9PL
Derby. The Derby Microcomputer Society: F. Taylor, Secretary, c/o 5 Park View Close, Allestree, Derby DE3 2GH. Tel: Derby 559334
Huntingdon. RAF Personal Computer Association: Sqn Ldr J. A. Upham, Man S (ADP), HQ RAFSC, RAF Brampton, Huntingdon PE18 8QL
Norwich. Amateur Computer Club: Andy Leeder, Church Farm, Stratton St. Michael, Norwich NR15 2QB
Norwich. Norwich & District BBC Microcomputer User Group: Roy Street, Church Farmhouse, Themelthorpe, Dereham, Norfolk NR20 5PS. Tel: Foulsham 579
Nottingham. BBC Micro User Group: John Day, 8 Warkton Close, Chilwell, Notts NG9 5FR. Tel: 0602 225660. Prestel: 602 225 660
Redditch. Redditch Computer Club: Anthony Green, 14 Radway Close, Redditch, Worcs B98 8RZ. Tel: 0527 61434
Stoke. POTBUG BBC User Group: J. Forest, 50 Cliff Street, Smallthorne, Stoke-on-Trent, Staffs. Tel: 818430
Stratford. Stratford Computer Club: Chris Parry, Secretary, 15 Kipling Road, Stratford-on-Avon. Tel: 0789 68080
Suffolk. West Suffolk BBC Micro Users' Club: Antony Hurden, 14 Plovers Way, Bury St Edmunds, Suffolk IP33 2NJ

NORTH-WEST

Cheshire. Mid-Cheshire Computer Club: Simon Sadler, 75 Swanlow Lane, Winsford, Cheshire CW7 1JD. Tel: Winsford 53339
Cumbria. West Cumbria User Group: P. Majid, Tel: 0946 62732 or K. Purkiss, Tel: 0946 66586
Mersey. Mersey BBC User Group: Nik Kelly, 56 Queen's Drive, Liverpool L4 6SH
Preston. Preston BBC User Group: Duncan Coulter, 8 Briar Grove, Ingol, Preston PR2 3UR

NORTH-EAST

Huddersfield. Huddersfield BBC Micro User Group: Stuart Mallinson, 34 Ryefields, Scholes, Huddersfield, West Yorkshire HD7 IXF
Hull. Forum 80: 421 Endike Lane, Hull HU6 8AG
Hull. MUSE (for teachers): PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD. Tel: 0482 20268
Hull. TRS-80/Beeb Users Group: R. V. Souter, Secretary, 4 Risby Garth, Skidby, Cottingham, Hull HU16 5UE. Tel: 0482 845326
Newcastle. Newcastle and Washington BBC User Group (NEWBUG): Jeff Cranmer, c/o Washington Town Centre Library, The Galleries, Washington, Tyne & Wear. Tel Houghton (927) 849342 after 6pm
Sheffield. ABUG: John Fryer, Treasurer, 17 Edgedale Road, Sheffield S7 2BQ
Sheffield. Parson Cross BBC User Group: Andrew Grant, 28 Rokeby Road, Sheffield S5 9FU. Tel: 0742 461203
S Yorks. South Yorks Personal Computer Group (SYPCG): Bob Hindle, 139 Penrhyn Road, Sheffield S11 8UP
Wakefield. Wakefield BBC Micro User Group: The Secretary, 116 Pinderfields Road, Wakefield, West Yorkshire WF1 3PL

SCOTLAND

Central Scotland. BBC User Group: D. Davidson, 1 Roxburgh Place, Larbert, Stirlingshire FK5 4UE
Inverclyde. Invercylde BBC Micro Users' Club: Robert Watt, 9 St John's Road, Gourock, Renfrewshire PA19 1PL. Tel: Gourock 39967

OVERSEAS

Australia. BBC Users Group of Canberra: Steve MacLeod, 5 Hatfield Street, Evatt A. C. T. 2617, Australia. Tel: (062) 587719
Australia. Beebnet: M. A. Cowley, President, PO Box 262, Kingswood, South Australia 5062
Australia. The Sydney BBC Microcomputer User Group: c/o Stuart McCann, 500 Miller Street, Cammeray, NSW 2062, Australia. Tel: Sydney 923 1137
Canada. Atom Users' Group of Canada: John Wood, 812 Cabot Trail, Milton, Ontario L9T 3M8, Canada
Canary Islands (Spain). BBC Micro Club Tenerife: PO Box 1297, Santa Cruz de Tenerife, Canary Islands (Spain). Tel: (922) 216546
Eire. Irish Amateur Computer Club: Austin Vaughan, 35 Monastery Drive, Clondalkin, Dublin 22, Eire. Tel: (01) 593112 (evenings)
Eire. OIFIG: (Official Irish Forth Interest Group), c/o Hugh Dobbs, Newtown School, Waterford, Eire
Finland. Arjen Raateland, Hopeatie 10A21, 00440 Helsinki 44, Finland. Tel: 90-5625027
France. Club Informatique Assevent: X. Durieux, 7 rue des Warimetz, 59600 Assevent, France
Malta. BBC Micro Users' Club (Malbeeb): Ray Zammit, 'San Jose', Old Railway Road, Balzan, Malta
Netherlands. Big Ben Club: J. Assies, Secretary, PO Box 177, 4670 AD Zevenbergen, The Netherlands
Norway. BBC INFO: Horten Ingenlorhogskole, Skippergt. 6, 3190 Horten, Norway
Norway. Skandinavien BBC User Group: Frans-Otto Hendriks, Ludvig Karstensvei 14, 1064 Oslo 10, Norway
South Africa. Acorn Atom Users Group: J. G. Dowling, 27 Oribi Avenue, Van Riebeeck Park, Kempton Park 1620, South Africa
South Africa. Pretoria BBC Users Group: Stan Miller, PO Box 117, Montana 0151, South Africa
Sweden. BBC User Group (BUG): Anders Wickman, Folkungagatan 58, 116 22 Stockholm, Sweden
Tasmania. Tasbeeb (BBC Users' Group): Box 25 PO, North Hobart 7002, Tasmania, Australia. Tel: (002) 342704

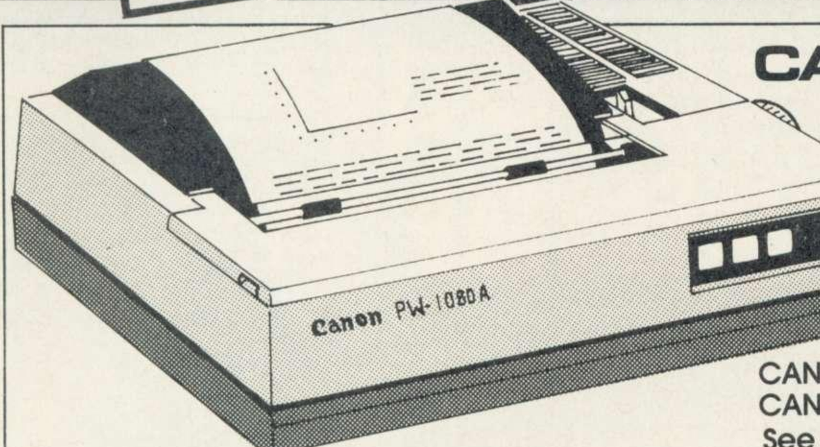
SPECIAL INTEREST

Bulletin Boards. Forum 80: 421 Endike Lane, Hull HU6 8AG
Disc Users. Format 40/80 Club: Peter Hughes, BBC Disc User Group, 5 Marsh Street, Bristol BS1 4AA
Electronics. Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW. Tel: Alton 87478
Forth. OIFIG: (Official Irish Forth Interest Group), c/o Hugh Dobbs, Newtown School, Waterford, Eire
Milton Keynes. BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes. Tel: (0908) 564271
Primary. Bracknell Primary Schools Computer Users' Group: D. Donaldson, Secretary, Wildridings County Junior School, Netherton, Bracknell, Berks RG12 4DX
Radio. Radio Amateur Micro User Group (G4KCS): The Secretary, c/o R. A. Webb, 39 Aldworth Road, Stratford, London E15 4DN
Teachers. MUSE. (for teachers): PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD. Tel: 0482 20268
6502. 6502 North London User Group: Jim Chambers, Dept. of Psychology, University College, 26 Bedford Way, London WC1. Tel: 01-387 7050 Ext 413

QUALITY IN PRINT



Top Service



CANON PW-1080A

NEAR LETTER QUALITY PRINTER
NLQ Mode 23 x 18 Matrix: 27 cps
Draft Mode 11 x 9 Matrix: 160 cps
Full range of Epson FX 80 Print Codes
Friction & Tractor Feed
Centronics Interface Standard
CANON PW-1156A Available
(Accepts 15" Paper)

CANON PW-1080A £278.26 + VAT = £320.00
CANON PW-1156A £360.00 + VAT = £414.00
See below for Printerpack prices

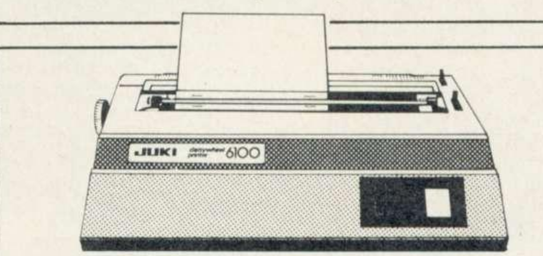
C.J.E. MICRO'S BBC PRINTERPACKS

CJE MICRO'S BBC PRINTERPACKS

For Star, Canon & Juki Printers include:
1. The Printer
2. 24 Hour Delivery
3. Cable to the BBC 1.3 Metres
4. Screen Dump Program (M/C Source)
5. Text Dump Program
6. Function Key set up Program. For use with WORDWISE
7. Function Key Label Printing Program. For use with above.
8. VIEW Printer Driver
9. 100 Sheets of Paper
10. Mains Plug with 3 Amp Fuse
11. Booklet giving details of using the printer with a BBC.
12. Character Defining Program for Downloadable-character-set

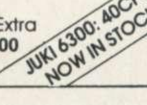
CANON PW-1080A C.J.E. PRINTER PACK £345 Inc. VAT
CANON PW-1156A C.J.E. PRINTER PACK £439 Inc. VAT
JUKI 6100 CJE PRINTER PACK £400 Inc. VAT
GEMINI 10X CJE PRINTER PACK £255 Inc. VAT

PRINTER CABLES/INTERFACES FOR MOST COMPUTERS STOCKED



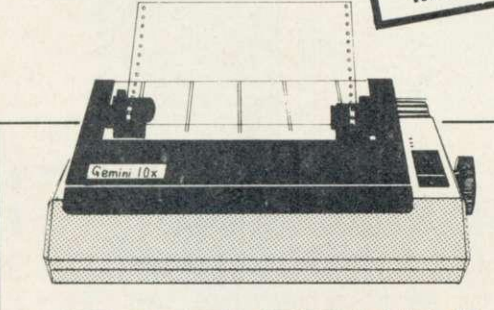
JUKI 6100

One Year Warranty
20 CPS: BiDirectional & Logic Seeking
10, 12, 15 & Proportional Spacing
Wordstar Compatible
2K Buffer: 13 Inch Platen
Underline: Backspace + Lots more
Centronics Interface Standard
RS 232 Interface £54.00 + VAT Extra
Tractor Feed £119 + VAT Extra
Single Sheet Feeder £199 + VAT Extra
JUKI 6100 £330.43 + VAT = £380.00
See left for Printerpack prices





STAR DP8480 (8" Printing) £187.00 Inc VAT
Ideal for BBC/Newbrain/HX20 & Spectrum Int. 1
Phone for full specification



STAR GEMINI 10X

One Year Warranty
True Descenders 9 x 9 Matrix
120 CPS Bidirectional & Logic Seeking
40, 48, 68, 80, 96, 136 cpl
Italics, Emphasized, Double strike
Super & Sub Scripts
Downloadable Character Set
Hi-Resolution & Block Graphics
Friction or Tractor Feed
10X 10" Carriage, 15X 15" Carriage
See above for Printerpack prices

Centronics Interface Standard
RS232 Int. £52.00 + VAT Extra
GEMINI 10X £235.00 Inc. VAT
GEMINI 15X £380.00 Inc. VAT

STAR DELTA 10

spec. AS FOR 10X PLUS:—
160CPS: 8K BUFFER
CENTRONICS + RS232 INT'S STD
£311.30 + VAT = £358.00

OFFICIAL ACORN APPROVED DEALER

PRINTAID

Powerful UTILITY for BBC word processors.
Mail Merging.
Easy entry of printer control codes.
Capability for proportional spacing with right-hand justification on Juki 6100
40 or 80 track........... £16.00
Send or ring for details.

EXPORT ORDERS WELCOME

VAT INCLUDED WHERE APPLICABLE
PHONE/CREDIT CARD ORDERS WELCOME
Postage 50p per order or as stated
Next day Delivery for Printers/Disk Drives £8.00
FULL RANGE OF CONNECTORS & CABLES AVAILABLE
PRICE LIST ON REQUEST

RING FOR SAMPLE PRINTOUT, FULL SPECIFICATIONS & LATEST PRICES



Dept AU, 78 Brighton Road, Worthing
W. Sussex BN11 2EN (0903) 213900

We've been inundated with Free Ads — more than twice as many as we can carry. This has led to delays in publication and disappointment for readers. The Free Ads are carried in the magazine as space permits, so please allow up to three months for yours to appear.

Acorn User has been alerted to the abuse of the free ad service and, regrettably, can no longer accept entries selling or swapping software.

MICRONET modem and comms ROM, all leads and power supply included. £45. Tel. Atherstone 4906, (Warwickshire).

DUAL, double sided, double density, 40 track Shugart disc drives, with case, integral power supply unit, mains lead, dual BBC ribbon cable and formatting disc. £250 ono. Tel: Wayne on (0604) 405210 after 6pm.

DUAL disc drives, dual sided, dual density, 400k, own power supply, suitable for a BBC micro with a disc interface already fitted. £250 ono. Ring Sheffield (0742) 396995 after 6 pm.

BBC model B +7½ inch green screen monitor, tape deck, Aviator software + various books, only six months old – £420 ono. Tel: 0253 46723.

ACORN ATOM, 15k RAM, two SSSD drives, home-brew DFS and interface with manual. Lots of software (on disc), ROMs, books, etc. Cheapest disc-based system ever at £250 ono. Russell on 01-249 0035.

TEXAS Instruments 745 Data Terminal. Has keyboard, 80 col thermal printer and built-in acoustic modem (300 baud), with connecting lead for BBC micro, manual, additional leads and paper. Only £275. Contact: Richard, 01-249 2406.

LATEST Ultradrive floppy tape unit by Ikon. Operating system on sideways ROM, uses standard DFS commands and user port. Three data certified cassettes plus utilities cassette £55 ono. Faller, 01-449 1808.

SIDEWAYS RAM owners – have you had persistent or unresolved hardware problems? If so, please drop me a line. Geoff Smith, 84 Edenfield Gardens, Worcester Park, Surrey KT4 7DY.

ACORN Z80 second processor, with bundled software and documentation. Exchange DNFS for DFS. Mint condition: a reluctant sale. Bargain at £300. Tel: Hemel Hempstead 45782 (evenings and weekends only).

DOUBLE single sided 40 track disc drive £150. Acorn DFS upgrade kit with above £200. Purchase of Torch pack forces sale. Farnham, Surrey 0252 710566.

DISC drive: **BBC** original 100k, cable and utility disc £140 ono. Tel: 01-731 6069 (eves). Upgrade forces sale; recently serviced.

ADVANCED User Guide and Caesar The Cat cassette, brand new, £10. Tel: 0790 53161 after 4pm and ask for Jason.

PRISM acoustic modem for Prestel, Micronet 800, etc. With mains adaptor, cable for BBC micro, Micronet software on cassette (with instructions for transfer to disc), and manual. Only £35. Contact: Richard, 01-249 2406.

ELECTRON Plus 1 interface and Voltmace 3B joystick, still boxed, £55. Tel: George, Helensburgh (0436) 6336.

ARIES B20 for sale. Unused, but in perfect condition. Call 01-675 0077 after 6.30pm or anytime weekends.

ACORN ATOM 12k + 12k, FP ROM, programmer's toolbox + VIA printer port, games, books, manuals etc. £40 ono. Telephone Tamworth 873 406.

OWLFOOD products. Information wanted by collector, to your advantage. Tel: 0223 359904 after 6 pm.

BYTE, Kilobaud, DDJ, etc, back issues for sale or exchange. SAE list. Smith, 84 Edenfield Gardens, Worcester Park, Surrey KT4 7DY.

WANTED BBC micro. Must be 1.2OS. Also disc drive wanted. Tel: Bolton 397408.

LIGHTPEN Datapen. Hardly used – VGC, original casing + software. Button for incorporating in your programs. Instruction manual. Normally £25, I will sell for £15. Contact me on (0223) 870148 after 4 pm and ask for Frazer.

BBC B Supertalker Phoneme Synthesizer plus 560-word ROM £20, DFS 0.90 EPROM £12, books: Discovering BBC Machine Code £5, Zaks CP/M Handbook £6. Tel: 0480 68686.

ELECTRON 32k, magazines, books, leads, games, First Byte joystick interface still under guarantee, for £170. Reason for sale – unwanted present. Tel: 01-640 6248, Mitcham, Surrey. Ask for Joan in the evenings.

BBC B 1.2OS, TM100 modem, joysticks, all Acorn Users, Micro Users, Beebugs. Sprites utilities, Paintbox, Exmon, White Knight, Forth + manual, Advanced User and ROM guide and other technical books. Cost £700, accept £399. 031-664 2241.

AMCOM DFS latest issue plus utilities disc and manual, £18. Tel: Harrogate 864603.

DATAPEN for sale. Lightpen and software for £10. Lightpen will connect to BBC micro. Send cheque or postal order to Jonathan Greenwood, 38 Law Lane, Southowram, Halifax, West Yorkshire HX3 9QP.

ELECTRON with software and all leads, some books £200. Will consider any offer. Phone 01-660 6877 (Croydon). Ask for Tim.

MODEM Minor Miracles modem WS2000. All leads and manuals. 600/600 baud, 300/300 baud and 1200/75 baud. Cost £150, will sell for £70. Phone (0873) 4955 after 6pm. 22 Avenue Road, Abergavenny, Gwent NP7 7DA.

BRAND NEW Acorn interface kit for BBC B for sale: £97. Ring Mr Bilkhu on 021-745 8537 after 6 pm. Daytime, 021-622 2128.

6502 2nd processor £160. Cumana 100k disc drive £100. Micro Robotics EVI Camera £100. Tel: 051-638 7466.

MICRONET acoustic modem and cassette software, perfect condition, including PSU, leads etc, £37.50 ono. Buyer collects. Ring after 6pm 01-299 1980, for Stephen Corcoran.

BBC B Disc drive interface only £80. Free fitting. Reply to D.K. Smith, 'Wymondham', Nuthampstead, Nr Royston, Herts SG8 8ND or ring Barkway 206.

BLANK EPROMs. Both 2764 and 27128 types. Please phone for further details. 0279 812295.

ATOM for sale. 12k + 12k, VIA, FP ROM, Disatom, PSU, books, software, £80 ono. Tel: Clive on 01-458 9033.

ROYALTIES: if you have experienced difficulty recovering your royalties from any so-called 'software house', then please write to me in strictest confidence: Geoff Smith, 84 Edenfield Gardens, Worcester Park, Surrey KT4 7DY.

IKON Ultradrive plus six tapes. Will swap for Acorn Speech Synth. Will accept chips on their own. Write to James Oates, 6/7 Southhouse Crescent, Edinburgh or call 031-664 2949 any time.

DISC drive, s/sided 100k, 40 track including cables. Good condition, £55. Tel: Haywards Heath (0444). 451720 after 6pm (West Sussex).

LYNX 48k with user/Z80 manuals, 'Lynx Computing' book, user group/Camputers newsheets, lightpen, leads and software, £100 ono. Tel: Yarmouth (0493) 669746 (evenings).

JUKI 6100 daisywheel printer. Immaculate condition, spare ribbons, cable. £290 ono. Prism modem 1000, 1200/75 for Micronet/Prestel with software and cables. £55 ono. 'The Music System' by Island Logic, (disc) £20. 0227 751100.

FREE PERSONAL AD SERVICE

Sell your old hardware or pass on information. Fill in the form below to a maximum of 32 words (one in each box) and send it to Acorn User Free Ads, 68 Long Acre, London WC2E 9JH. Use capital letters, and remember your name, address or telephone number. Without this full information, supplied on a separate sheet of paper, we regret that we cannot carry your Free Ad. This is a service to readers – no companies please. One entry per form only, and we cannot guarantee any issue.

3 storey computer homes for under £60

Looking for a new home for your computer? Tired of being pushed from room to room with your family of peripherals? Better take a look at the Organiser showhome from Opus Supplies. It's fully mobile and combines practical features with modern design.



3rd storey
– Impressive view and just the place for your monitor and printer

2nd storey
– Lots of floorspace for your computer and disc drive or cassette recorder. Ample storage space for your software.

1st storey
– Parking space for your books, manuals and magazines.

And at only £59.95 you won't even need to take out a mortgage.

The Organiser desk from Opus Supplies comes complete with castors and simple assembly instructions and our price includes VAT and free delivery.

To order your system phone us on: 0737 65080
or post the coupon to Opus Supplies Limited.

To: Opus Supplies Ltd,
55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.

Please rush me the following:
(PRICES INCLUDE VAT AND CARRIAGE)

__________ Organiser Desk(s) at £59.95 each (inc. VAT)

enclose a cheque for £__________ or please debit my credit card account with the amount of £__________
My Access ☐ Barclaycard ☐ (please tick) no. is:

____

Name__________

Address__________

____

Telephone__________

Opus.
Opus Supplies Ltd.

55 Ormside Way,
Holmethorpe Industrial Estate, Redhill, Surrey.
TELEPHONE: 0737-65080

■ **Joysticks** Now with 'Accu-trak' analogue movements for games and CAD/CAM applications. Still best value at £12.95 per pair. Send now to: Peritron (Dept AU), 21 Woodhouse Road, London N12 9EN.

■ **'Netword'** Wordprocessor. BBC/Electron. Networks/Disc/tape. Easy for beginners, yet documents up to 200k, from £12. SAE, E J Holt, 7 Cambridge Rd, Stamford, Lincs.

■ **Fourier:** Analysis program. Displays waveform and then harmonic spectrum. Define your own waveforms. Supplied with sine square, pulse. £9 cassette, 40-track disc £15. P Edwards, 35 Woodsland Road, Hassocks, West Sussex.

■ **'Nutcracker':** Tape 2 Tape +Tape 2 Disc+Disc 2 Disc +Disc 2 Tape: £5 Rompull +Tapedump: £5. Super disc menu: £5. ROM-filing system generator: £5. R-Soft, 22 Marriotts Close, Felmersham, Beds MK43 7HD. 0234-781730.

■ **Copycat 3.5:** Disc to disc back-up utility. Back-up all discs. Single density only. 40/80 track disc £8.95. Integral software, 11 Grove Park, Bangor, Co. Down, N. Ireland BT20 5QT. 0247 463603.

■ **Listing Paper:** 9½" plain, 2000 sheets £14; labels 69×36, 1000 £4; prices include p&p. C.W.O. BCC 130 Northfields Lane, Brixham, Devon TQ5 8RH.

■ **Do you** require an EPROM programming service? 8k £10, 16k £18. If interested, please write to A. Miles, 23 Park Prospect, Graigwen, Pontypridd, Mid Glamorgan.

■ **WM 2000:** m/c screen dumps for BBC B. 6502 compatible. Multi-tone in modes 1, 2 and 5. No mode 7 dump. Send £11 for disc or sae for details. Dr A Cownie, 7 Chatsworth Road, Worsley, Manchester M28 4NU.

■ **Lockfile:** A user friendly database with a personal password entry code, disc only. Operations: Sort, Printout, Amend, Search, 6502 compatible, £9.75. **HACKERS!** A guide for the novice in tracing unlisted computer phone numbers, £3.50. Andersons, 56 Waterloo Road, Freemantle, Southampton.

■ **'Fraccy!':** The Frak extension. Improved sound, more lives and autoboot onto next level. £2.50 on cassette. Cash, cheque or postal order. Michael Oldroyd, Greenwayes BB2 5JL.

■ **'D-Master':** The most powerful disc backup program seen so far: £7. Nutcracker owners: £3. Handles sectors from 128-2048 bytes, deleted or not, etc. R-SOFT, 22 Marriotts Close, Felmersham, Beds MK43 7HD. 0234-781730.

■ **Mathematical Graph plotter** Multiple graphs – variable axes – grid – text – variable colour. Tape £5.95, 40t disc £6.95. G Digby, 44 Lucy Hall Drive, Baildon, W Yorks BD17 5BH.

■ **Educational Programs:** (language development, spelling, mathematics, logical thinking), BBC computer, disc only. Details: Gifted Children's Information Centre, 'Hampton Grange', 21 Hampton Lane, Solihull B91 2QJ. Tel: 021-705 4547.

■ **Light Pen:** The Pennant Commander for BBC B including comprehensive software (paint, draw, create, etc.), £17.85 inc. Pennant, 29 Hounds Road, Chipping Sodbury, Bristol.

■ **BBC** Program listings. * Any length * £1.50! – *Great Service!* Guaranteed to send back in 24 hrs! Send tape, large sae, Cheque/PO/Money Order to David Mohammed, "Palmiste", Owlsmoor Rd, Owlsmoor, Camberley, Surrey GU15 4SP.

■ **Put your** Beeb to work. High quality software wanted by publishers for BBC/Electron. Send cassette/disc or sae for details. Pembroke Publishing, 50 Woodstock Way, Hartlepool, Cleveland.

■ **How-To.** An essential collection of S/W plus instructions for frustrated new disc owners. £5. Many satisfied users, R-Soft, 22 Marriotts Close, Felmersham, Beds MK43 7HD. 0234-781730.

■ **ROM:** Command clash problem? Simple, inexpensive solution. Your ROM rewritten. Your name included in ROM. SAE for details. Supersoft, 5 Leggatts Close, Watford, Herts WD2 6BG.

■ **Make Money** from writing and selling software. This business guide covers all aspects of selling home-produced software including copyright and publishing. £2.75 inc p/p. Cheque/PO to Shaftsbury Publications, (Dept BG3), 61 Warleigh Road, Brighton, E Sussex BN1 4NS.

■ **Good Home** wanted for Acorn Electron with over £50 worth of software. Ring Macclesfield (0625) 74911. All offers considered. I also have a ZX81.

■ **Designer** EPROM. PROGRAM your BBC with Character Definer, Teletext Screen Designer (with program generator) and Extended Trace facility. PROTECT your BBC with your name and address displayed at switch on. PERSONALISE your BBC with function keys automatically programmed to your definitions. All on one EPROM, only £15. SwanSoft, 53 Orchard Way, Thorpe Willoughby, Selby, N. Yorks Y08 9NE Telephone: (0757) 704134.

■ **Atom users!** Follow the Bear for software and hardware. Lots of new items for your Atom. Serious expansion no longer just a dream. Also printers, disc drives, etc, for Atom and BBC. 100gm rate stamp (not SAE) for details to: BEAR HARDWARE (RP), 68 Harmondsworth Lane, Harmondsworth, Middx UB7 0AA.

We must remind advertisers that we cannot carry advertisements which incite readers to break the protection and therefore copyright of commercial software.

■ **WORDWISE** MADE SIMPLE. A user guide to wordprocessing on the BBC microprocessor. A manual written in step-by-step exercises, used for self-teaching, in the classroom, or as reference guide. Published by Nottingham ITeC. Send cheque for £6.50 plus 40p p&p payable to Nottingham ITeC Resource Centre, 51 Glasshouse St, Nottingham NG1 3LP. Tel: (0602) 584647.

■ **Acorn** Music 500 synthesiser, virtually new, unwanted. £160. Phone 01-539 1697 after 7pm (London E10).

■ **Colour** Screen dumps. BBC with Tandy CGP115, MCP40, Oric printer. Dump your best graphics in full colour. £3.50 G Brown, 3 Orchard Gardens, West Challow, Wantage, Oxon OX12 9TL.

■ **'Hair Defender'** Zap down choppers while answering hairdressing topics. Ideal for anyone training in hairdressing. Micronet software review, **** rating. BBC 40/80 track discs, £15. Wanted: original hairdressing programs, eg. 'hairdressing accounts', 'customer records'. 30% royalties. Lists. John Lyons Computer Software, 'Software for Hairdressing', FREEPOST, Camberley GU15 3BR.

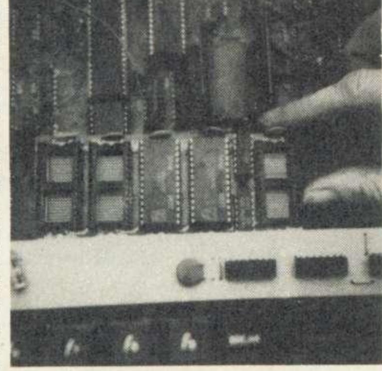
■ **Elite** How to fully equip your ship and obtain as many credits as required, quickly, without leaving station. £2.25. Knight, 59 Market Street, Hindley, Lancs WN2 3AE.

£10 SMALL AD SERVICE

Please include your cheque for £10 made payable to Redwood Publishing. This is the standard fee. Don't forget your name, address or phone number. Send cheque plus form to Acorn User Small Ads, 68 Long Acre, London WC2E 9JH.

UP TO 32k SIDEWAYS RAM BOARD

FOR THE BBC PLUS CAPABILITY OF WRITE PROTECTION INCLUDED.



This RAM board comes complete with 16k of RAM fitted and sockets available for an additional 16k RAM which can be fitted later by plugging in, this will give a total capability of 32k.

Plugs directly into socket 12 or 15 in BBC or onto one of the H.C.R. ROM boards. No soldering will be required and it has the extra bonus of a write protect switch to be mounted either in the reset space, rear of case or in spare LED position on right hand front of keyboard. A right protect switch is fitted to prevent corruption of data loaded into RAM.

Sideways RAM is intended to run sideways ROM type software of your own either under development or as an alternative to actually committing to expensive eproms.

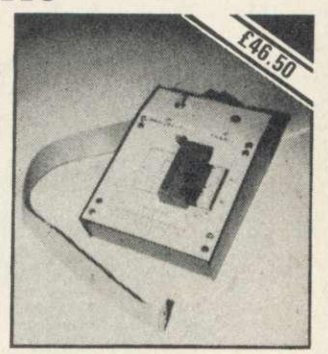
Sideways software may be kept on disc and loaded into sideways RAM simply by typing *Load <NAME> 8000. The RAM can be loaded 16k at a time or by assembling to Hex 8000. A simple program is provided in the manual to transfer software (in RAM or ROM) into user RAM where it can be modified and written back to RAM or saved on disc. With suitable software RAM can be used as a printer buffer or as a data store, etc.

Supplied complete with 16k of RAM and easy fitting instructions £31.50 (£36.22 inc VAT)
Further 16k RAM £20 (£23.00 inc VAT)
Please allow £2.00 P&P

Also available: Internal 16 socket ROM/RAM card, External 28 socket ROM/RAM card, Eprom Programmer & eproms

EPROM PROGRAMMER

FOR THE BBC



A very high quality product direct from the manufacturers, contained in attractive sloping box with low insertion force socket and neon indicator for programming fitted as standard, the software adopts the high efficiency method for programming 2764 and 27128. This allows up to 100% faster programming, software in machine code, supplied on cassette and can be placed in eprom. Very easy to use, menu driven with easy to use instructions. This unit is completely self contained with its own power supply and plugs into the user port.

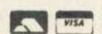
THIS PROFESSIONAL UNIT ALLOWS:

1. Will program: 2716, 2732, 2532, 2764 and 27128 eproms.
2. Copy eprom into memory and compute checksum.
3. Blank check eprom.
4. Program eprom from memory.
5. Verify byte by byte and compute checksum.
6. allow buffer start area to be changed.
7. All operating system calls may be used when in menu mode.
8. Semi-intelligent programming. Typical time to program a 2764 8k device is approx. 50 sec. depending on the data to be programmed.
9. Additional software supplied to enable your own program (basic or machine code) to be put into eprom with the necessary leader information to allow calling with a *command. Downshift routine to enable basic programs to be run is also supplied.

COST £46.50 please add 15% VAT £1.00 post and packing

ALSO AVAILABLE RAM/ROM CARD
(Details on Request)

ORDERS TO:
H.C.R. ELECTRONICS, Industrial Unit, Parker Road, Chelmsford, Essex CM2 0ES
24 Hour Answer Phone Service:
Chelmsford (0245) 350188





ACORN USER ADVERTISEMENT PAGES – MAY ISSUE

CROSSWARE CROSS-ASSEMBLERS

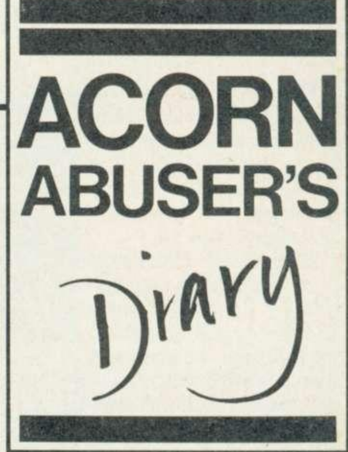
FOR THE STAND-ALONE BBC MICRO

Available on disc for the following processors:
6800/6801/6802/6301, 6805/146805, 6809 Z80, 8080A/8085

And now the **68000**

Phone or write for full details.

CROSSWARE PRODUCTS
Melbourn, Royston, Herts SG8 6BA
Tel: 0763 60838









A tale of men in the land of fen

ONCE upon a time, deep in the land of Fen, there lived a physicist called Mr Germann. Now Mr Germann was very clever and one day he discovered a new atom. Mr Germann was very pleased with his new atom and told his friend Mr Hurry all about it. 'Mr Hurry,' he said, 'I've discovered a new atom and I'm calling it Uranium.'

Mr Hurry was also very excited about this discovery and, having a sharp eye for business, realised there might be some money to be made. So he set off down the road with a pile of atoms to sell.

Mr Hurry was a good salesman and he had soon sold all the atoms. So Mr Germann found more and Mr Hurry sold more and they started making lots of money. Mr Hurry knew all about markets and one day said to Mr Germann, 'Mr Germann, there's going to be a boom at Christmas. Let's get lots of atoms, store them away and make a killing.'

So they collected lots and lots of Uranium atoms, gave them to Mr Goat to keep in the garden shed, and it was just as Mr Hurry predicted. They all went



and they sure made a killing.

Who should walk by than Sig di Spaghetti. Now Sig di Spaghetti was very astute and, taking advice from Mr Squirrel, decided to invest in acorns and keep them for a rainy day.

So he gathered up all the electrons that had fallen off the atoms and made his own Piol. Then he took Mr Goat, who had suffered from fallout, to see Mr Ollie who knew about sick animals. Mr Ollie told Mr Goat he should really have eaten apples and not acorns.

Moral: an apple a day keeps Ollie, vetti, away.

Image man spitting mad

PETE Ryvita, image-conscious, yoga-young ideas man at Acorn's video arm, threw a wobbler when his car was broken into just before a computer show earlier in the year.

But what really made him spit was that the only working model of the ABC-based video computer was stolen. The AVC900, as it is called, disappeared from his car never to be seen again.

Jacuzzi on wheels

FOLLOWING his immensely successful C5 electronic bathtub we hear that Uncle Clive is testing the C15 electronic jacuzzi.

Chief test driver Paul Bond, younger brother of James, world famous for vehicular bathing beauty excess, commented: 'We can already get it up to 5mph without changing the water. Things look good for a summer launch. We might even change the name to Zeel5.'

Uncle Clive on Z-cars?

Orson in decline

IN ITS search for a new chief executive we can exclusively reveal that among the candidates was one O Fact. It seems that our Orson was in fact offered the position as chief car crasher but had to decline for financial reasons.

Part of the deal would have been a mammoth share option but unfortunately Orson's independent backing was insufficiently large to cover the possibility of the shares dropping in price.

Buy-out rumour

RUMOURS that *Acorn User* had been bought out by Italian publishers Mamma Mia Magazines were described as 'premature' by Chris Curry's maternity spokeswoman today.

'Itsa not true! Da editor Antonio di Queeni is Inglees as da Royal Family!' she retorted.

The Milan stock exchange closed six points up.

Contract contact

DEAR, oh dear, more companies being tiresome about the BBC contract. Apple want a bite and Foster's lot are in on the ACT. Next it'll be Seiko with their fancy watches.



Cocky Clive gets his comeuppance in the canteen

WE WARNED Uncle Clive. It had to end. He was getting far too cocky – throwing his weight about all the time. Armageddon took place last Tuesday.

We all went to lunch as usual, but he seemed strangely pettish. A slight disagreement with one of the canteen ladies regarding the exact number of beans to which he was entitled with his egg and chips, and that was it. He challenged her to a fisticuffs session behind the kitchens.

Well, she was only small, but what a mover! Whatever he tried, she had the counter.

Despite encouragement from his closest aides – 'Stick one on 'er, champ' and 'Lay the nut across 'er, Clivey baby' – he was soon reduced to a bloodstained heap.

She obviously had one like him at home.

We borrowed a tray trolley and wheeled him back to the office for repairs, but he's a broken reed now, sulking behind locked doors writing grumpy poison-pen letters to Heinz.

She, on the other hand, is quite unbearable with her cries of 'Ah whupped him good' and her Ali shuffle. Still, at least we can remove our motorcycle helmets and sticking plaster now.

ARE YOU HALF A USER

TEN MAGAZINES PER YEAR • NEWS •
SOFTWARE • DIS
SPECIAL OFFERS
INFORMATION •
TECHNICAL SUP
USER GROUPS •
REVIEWS • NEWS
HINTS & TIPS • DI
APPLICATIONS •
PROGRAMS • SP
GAMES PROGRA
UTILITIES • SOFT
DISCOUNTS • RE
SOFTWARE • NE
INFORM
TECH
USE
RE

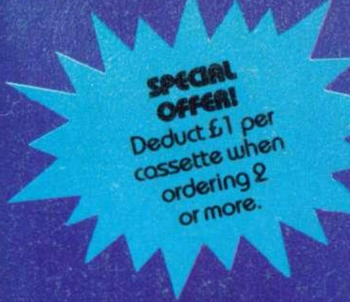




Become a complete user with BEEBUG

Send or phone for a FREE information pack (UK only)
OR
take out a subscription NOW.
(£11.90 1 year, £6.40 6 months UK only)

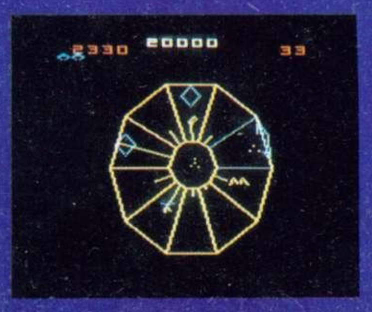
Telephone (049481) 5228
BEEBUG dept 13, PO Box 109, High Wycombe, Bucks.



TEMPEST

ACORN ELECTRON
BBC MICRO

◆ AN ARCADE-GAME EXPERIENCE ◆



















TEMPEST **£9.95 cassette/£11.95 disc**

At last, a program for the BBC micro and Acorn Electron which faithfully recreates the arcade game of the same name. This is an official Atari-approved version of Tempest – the screen grids, the aliens, the colours and the style of play are all as close as possible to the arcade original. Your are armed with a Blaster and a Super Zapper to defend yourself from the encroaching Flippers, Spikers, Flipper Tankers, Fuseballs and Pulsars which move along the grids of the stargate. There are 255 increasingly difficult levels of play, including invisible grids as you become more advanced. An excellent game, destined to become a 1985 top-seller, Tempest is available for the Acorn Electron on cassette, and for the BBC micro on cassette or disc.

OTHER TITLES AVAILABLE: £7.95 EACH ON CASSETTE

OVERDRIVE (BBC/ELECTRON)
SMASH AND GRAB (BBC/ELECTRON)
MR. WIZ (BBC/ELECTRON/C64)
SPACE PILOT (BBC)
BMX ON THE MOON (BBC)
STAR STRIKER (BBC)
JACK AND THE BEANSTALK (BBC)
COSMIC KIDNAP (BBC)
ALIEN DROPOUT (BBC/ELECTRON)
STRANDED (BBC/ELECTRON)
BATTLETANK (BBC)
HUNCHBACK (BBC)
SPITFIRE COMMAND (BBC)
WORLD GEOGRAPHY (ELECTRON/ 64)
ROAD RACER (BBC)

WE PAY UP TO 20% ROYALTIES FOR HIGH QUALITY BBC MICRO AND ELECTRON PROGRAMS.



SUPERIOR SOFTWARE LTD.
Dept. AU5, Regent House,
Skinner Lane, Leeds 7
Tel: 0532 459453



OUR GUARANTEE

(1) All our software is available before we advertise.
(2) All our software is despatched within 48 hours by first-class post.
(3) In the unlikely event that any of our software fails to load, return your cassette to us and we will immediately send a replacement.

THE SCREEN PICTURES SHOW THE BBC COMPUTER VERSION OF "TEMPEST"